THE

School-maſter's Aſſiſtant.

BEING A

Compendium of ARITHMETIC,

BOTH

PRACTICAL and THEORETICAL.

In FOUR PARTS.

Adapted both to the Trade of *Great Britain* and *Ireland.*

CONTAINING,

I. Arithmetic in Whole Numbers, methodically and briefly handled.

II. Vulgar Fractions, wherein ſeveral Things, not commonly met with, are there laid down in the plaineſt Manner.

III. Decimals, Extraction of Roots; Intereſt, Annuities, Rebate, and Equation of Payments.

IV. A large collection of Queſtions with their Anſwers, ſerving to exerciſe the foregoing Rules; together with a few others, both pleaſant and diverting.

The WHOLE

Being delivered in the moſt familiar Way of *Queſtion and Anſwer,* is recommended by ſeveral eminent *Mathematicians, Accomptants* and *Schoolmaſters,* as neceſſary to be uſed in *Schools* by all Teachers, who would have their Scholars thoroughly underſtand, and make a quick progreſs in *Arithmetic.*

By *THOMAS DILWORTH,*

Author of the *New Guide* to the *Engliſh* Tongue; and *School-maſter* in *Wapping.*

To which is added a very neceſſary APPENDIX, containing Some Additions with reſpect to the ſhort Ways of caſting up the Price of Goods by Multiplication, with Diviſion of Money; and concluding with Intereſt in Epitome at 5 and 6 *per Cent.* by *T. M.*

DUBLIN:

Printed by R. JACKSON, in *Meath-ſtreet*, 1776.

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CAMBRIDGE

THE PREFACE Dedicatory.

To the Reverend and Worthy

SCHOOLMASTERS

IN

Great Britain *and* Ireland.

Gentlemen,

AFTER returning You my moſt hearty Thanks for your kind acceptance of my *New Guide* to the *Engliſh* Tongue, permit me to lay before you the following Pages, which are intended as an Help towards a more ſpeedy Improvement of your Scholars in *Numbers*, and at the ſame time to take off that heavy Burden of writing out Rules and Queſtions, which you have ſo long laboured under.

I need not, I preſume, ſay any thing concerning the Uſefulneſs of, and Advantages that accrue to Mankind in general, from *Arithmetic*, ſince they are by this time pretty well known; and alſo deſerve the Employment of a much better Pen than mine can pretend to be; but I will venture to ſay thus much, and I believe you will pardon me for it, that This (by putting one into each *Arithmetician's* Hand) will not only prove a kind *Aſſiſtant* to you, but upon Trial be found at once, both to delight and improve the Minds of thoſe who are committed to your Care.

I have gone thro' all the Parts of *Arithmetic*, commonly taught in Schools, and have included ſeveral others no leſs uſeful: And tho' I have given more Queſtions to work upon in each Rule (which was abſolutely neceſſary; none having yet calculated their Performances, of this Kind, for the uſe of School-boys) I have endeavoured at the ſame time to reduce the whole, to as neat and portable a Volume as any that have gone before me.

I muſt confeſs I do not propoſe by this to add to any Maſters' Knowledge in Arithmetic, who, I imagine, is already acquainted with every thing contained in this Compendium; for which reaſon it is reduced to the narrow Compaſs it now appears in, without particular Directions for working the operations at large; and therefore I conceive, here is Room enough left for every Man to ſpeak his own Mind, and inſtruct his Pupils in his own Method. And,

I believe, it is confeſt by all, that it is a Taſk too hard for Children to be made complete Maſters of *Arithmetic*; and therefore the beſt Way of inſtructing them in it, is, moſt certainly, to give them a general Notion of it in the eaſieſt Manner, and to enlarge upon it afterward, if there be time; otherwiſe it muſt be done by themſelves, as their increaſe in Years, and growth in Underſtanding will permit. §'For *Arithmetic* is the more valuable, as it is the more exact, ' eaſy and ſhort; and the Art lies in giving as ' few Rules as poſſible, and clearly explaining ' them; and not confounding Principles toge-' ther, and then diverſifying them into ſeveral

§ *Watts*'s Eſſay.

‘ Rules, when they are built on the ſame Reaſon, ‘ which has not only made *Arithmetic* ſeem diffi‘cult of Acceſs, but has hindered many from be‘ing Accomptants.

To enter into a detail of the following Particulars, would be tedious, and ſwell this Preface beyond its juſt Limits; but that the kind Reader may not be wholly at a loſs, I ſhall beg leave to ſpeak as follows, viz.

1. That the whole is divided into Four Parts, as the Title page expreſſes it.

2. That the Rules and Examples are contrived in the eaſieſt Manner, and the Whole put in ſuch an eaſy Method, as is no where elſe extant.

3. I have omitted Reduction of foreign Coins, partly becauſe all thoſe Tables, which I have met with, which ſhow the Value of foreign Coin in *Engliſh* Money, are very erroneous; but principally becauſe all ſuch Queſtions as relate to the turning of the Money of one Country into that of another, are much better anſwered under the Head of Exchange. For the Value of foreign Species (ſuch I mean as relate only to Exchange) both of Gold and Silver, in every Country is unſettled, and therefore ſuch Coins are ſubject to vary in their Prices, as the Merchants find an Opportunity to profit by them. Hence proceed the various Courſes of Exchange; and from them again, the particular Worth of any Quantity of foreign Coin in *Engliſh* Money, which is ſometimes more, ſometimes leſs, according as the Courſe of Exchange runs at that Time when ſuch foreign Coin becomes due. Add to this the Agio or Advance-money, uſually paid abroad on the exchanging current

Money into Exchange or Bank-money, which is 2, or 3, or more *per Cent.* in Payment, according to what the Exchange or Bank-money is worth more than the Current-money; and this cannot be done otherwiſe than by the Rule of Three.

4. In Intereſt, &c. by Decimals, I have follow'd Mr. *Ward*'s Method, by which Means the Rule is drawn into a much narrower Compaſs, and appears more beautiful to the Eye than in Words at length.

5. In all Places where it could be done conveniently, I have given directions for varying the Examples by way of Proof: becauſe it not only diſcovers the Reaſon of the Operation, but at the ſame Time both produces a new Queſtion, and proves the old One. And ſure I am, that the varying the Queſtion, when it may be done under the ſame Rule, contributes very much towards a thoro' underſtanding of it, and making a good Accomptant, as every one's Experience will teach him.

6. I have thrown the Subject of the following Pages into a Catechetical Form, that they may be the more inſtructive; for Children can better judge of the force of an Anſwer, than follow Reaſon thro' a Chain of Conſequences. Hence alſo it proves a very good examining Book; for at any Time, in what Place ſoever the Scholar appears to be defective, he can immediately be put back to that Place again, without the formal Way of beginning every Thing anew. And,

7. In order to make the Progreſs ſtill quicker, every Example to be wrought hath its Anſwer annexed to it: So that they who do not chuſe to have every Operation proved by varying the Queſ-

tion, may know without it, whether the Work be right or not.

And now after all, it is poſſible that ſome who like beſt to tread the old beaten Path, and to ſweat at their Buſineſs when they may do it with Pleaſure, may ſtart an Objection againſt the Uſe of this well-intended *Aſſiſtant*, becauſe the Courſe of *Arithmetic* is always the ſame; and therefore ſay, That ſome Boys lazily inclined, when they ſee another at work upon the ſame Queſtion will be apt to make his Operation paſs for their own: But theſe little Forgeries are ſoon detected by the Diligence of the Tutor. Therefore as different Queſtions to different Boys, do not in the leaſt promote their Improvement: So neither do the ſame Queſtions hinder it. Neither is it in the Power of any Maſter (in the Courſe of his Buſineſs) how full of Spirits ſoever he be, to frame new Queſtions at Pleaſure in any Rule, but the ſame Queſtions will frequently occur in the ſame Rule, notwithſtanding his greateſt Care and Skill to the contrary.

It may alſo be be further objected, that to teach by a printed Book, is an Argument of Ignorance and Incapacity, which is no leſs trifling than the former. He indeed (if any ſuch there be) who is afraid his Scholars will improve too faſt, will undoubtedly decry this Method: But that Maſter's Ignorance can never be brought in Queſtion, who can begin and end it readily; and moſt certainly that Scholar's Non-improvement can be as little queſtioned, who makes a much greater Progreſs by this than by the common Method.

As to the Order of the Rules, I can hardly find two Maſters follow it alike; ſome liking beſt to teach thtt Rule firſt, which another thinks more convenient to teach afterward; while a third looks upon it as a Matter quite indifferent, among ſome Rules, which he teaches firſt. But this need be no Hinderance to the Uſe of this Book. For however the Rules are placed here, every Man may turn to that Rule firſt which he likes ſhould be taught firſt; and if a Maſter have a mind to teach Vulgar Fractions immediately after Reduction in Whole Numbers, as ſome do, he may do it as eaſily, as in the Order they now lie.

I ſhould have been very glad to have ſeen an Attempt of this Nature, ſtampt by the Authority of ſome Perſon of Diſtinction, and of better Abilities; but ſince no abler Hand has undertaken it, I hope its homely Appearance will not leſſen its Uſefulneſs.

The Printer's Errors, as well as my own Defects, I hope will candidly be overlooked But becauſe a Man's Failings are ſo familiar to himſelf, that he can ſcarce diſcern them; therefore the kind Admonitions of a good natured Reader ſhall always be very acceptable.

I have nothing more to add, but my repeated Thanks for Favours received, together with my earneſt Deſire that You may be proſperous in your ſeveral Undertakings, and to beg this Additional Favour of being eſteemed,

GENTLEMEN,

Your moſt humble, and

moſt obedient Servant,

THOMAS DILWORTH.

ON THE
Education of YOUTH.
AN
ESSAY.
Humbly offered to the Conſideration of
PARENTS.

THE right Education of Children, is a Thing of the higheſt Importance, both to themſelves and the Common-wealth. And 'tis owing to the want of this, that many, when they leave their Schools, do not prove ſo well qualified as might be expected. This great Omiſſion or Neglect, call it which you pleaſe, being for the moſt part chargeable on the Parents, I hope the following Particulars (which are the common Voice of our Profeſſion) will not be taken amiſs. And,

1. A conſtant Attendance at School is one main Axis whereon the great Wheel of Education turns. Therefore if that Obſervation, which is commonly made by Parents be true, That the Maſters have Holidays enough of their own making, there is, by their own Confeſſion, no Neceſſity for them to make an Addition.

‘ 2. Parents ſhould never let their own Commands run counter to their Maſter's, but whatever Task he impoſes on his Pupils to be done at Home, they ſhould be careful to have it performed in the beſt Manner, in order to keep them out of Idleneſs. * For vacant Hours move on heavily, and drag Ruſt and Filth along with them; and 'tis full Employment, and a cloſe Application to Buſineſs, that is the only Barrier to keep out the Enemy, and ſave the future Man.

3. ‘ Parents ſhould endeavour to be ſenſible of their Childrens Defects and want of Parts; and not blame the Maſter for Neglect, when his greateſt Skill, with ſome, will produce but a ſmall Share of Improvement. But the great Misfortune is, as the Proverb expreſſes it; Every Bird thinks her own Young the faireſt: And the tender Mother, tho' her Son be of an ungovernable Temper, will not ſcruple to ſay he is a meek Child, and will do more with a Word than a Blow, when neither Words nor Blows are available. On the other Hand, ſome Children are of a very dull and heavy Diſpoſition; and are a long time in gathering but a little Learning, and yet their Parents think them as capable of Inſtruction, as thoſe who have the moſt bright and promiſing Parts: And when it happens that they improve but ſlowly; tho' it be in proportion to their own Abilities, they are hurried about from School to School, till at laſt they loſe that Share of Learning which otherwiſe by ſtaying at the ſame

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* Watts's Eſſay.

ſame School they might have been Maſters of. Juſt like a ſick, but impatient Man, who employs a Phyſician to cure him of his Malady, and then becauſe the Diſtemper requires Time, as well as Skill to procure his Health, tells him, He has all along taken a wrong Method; turns him off; and then applies to another whom he ſerves in the ſame Manner; and ſo proceeds till the Diſtemper proves incurable.

4. ‘ It is highly neceſſary that Children ſhould be early made ſenſible of the Scandal of telling a Lye; To that End Parents muſt inculcate upon them betimes, that moſt neceſſary Virtue of ſpeaking Truth as one of the beſt and ſtrongeſt Bands of human Society and Commerce, and the Foundation of all moral Honeſty.

5. ‘ Injuſtice (I mean the tricking each other in Trifles which ſo frequently happens among Children, and is very often countenanced by the Parents and looked on as the Sign of a very promiſing Genius) ought to be diſcouraged betimes, leſt it ſhould betray them into that vile Sin of pilfering and purloining in their riper Years; to which the grand Enemy of Mankind is not wanting to prompt them by his Suggeſtions whenever he finds their Inclinations have a Tendency that Way.

6. ‘ Immoderate Anger and deſire of Revenge, muſt never be ſuffered to take Root in Children, For (as a moſt Reverend Divine obſerves) † If any of theſe be cheriſhed, or even

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† A. B. Tillotſon.

‘ let alone in them they will in a ſhort Time grow headſtrong and unruly; and when they come to be Men, will corrupt the Judgment, and turn good Nature into Humour, and Underſtanding into Prejudice and Wilfulneſs.

7. ‘ The laſt Thing that I ſhall take Notice of is, That while the Maſter endeavours to keep Peace, good Harmony and Friendſhip among his Scholars, they are generally taught the Reverſe at Home. † It is indeed but too common for Children to encourage one another, and be encouraged by their Friends in that Savage and Brutal Way of Contention, and to count it an hopeful Sign of Mettle in them to give the laſt Blow, if not the firſt, where-ever they are provoked; forgetting at the ſame Time, that to teach Children betimes to love and be good-natured to others, is to lay early the true Foundation of an honeſt Man. Add to this, that cruel Delight which ſome are ſeen to take in tormenting and worrying ſuch poor Animals as have the Miſfortune to fall into their Hands. But Children ſhould not only be reſtrained from ſuch barbarous Diverſions, but ſhould be bred up from the beginning to an abhorrence of them, and at the ſame Time be taught that great Rule of Humanity, To do to others, as we would they ſhould do to us.

‘ From what has been ſaid relating to the Management of Children at Home; the Neceſſity of the Parents joining Hands with the Schoolmaſter appears very evidently. For

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† *Talbot*'s Chriſtian Schoolmaſter.

‘ when the Maſter commands his Pupils to employ their leiſure Time in getting ſome neceſſary Parts of Learning; their Friends ſhould not command them to forbear: And when they ought to be at School at the ſtated Hours, they ſhould not be ſent an Hour or two after in the Time of Health, ſometimes with a Lye in their Lips to excuſe their Tardineſs; and ſometimes with an Order, and a brazen front to tell their Maſter, their Friends think it Time enough to come to School at Nine in the Morning, becauſe the Weather is a little Cold, or becauſe they muſt have their Breakfaſt firſt. I ſay, Parents ſhould not act ſo indiſcreetly, becauſe it clips the Wings of the Maſter's Authority: It makes Boys firſt deſpiſe and undervalue their Teachers, and then become unmannerly and impertinent to them; Correction for which makes the Tutor hated by the Children, and then there naturally follows either a total Diſregard to Buſineſs, or a general Careleſſneſs in every Thing they do.

‘ And, while I am ſpeaking of the Education of Children, I hope I ſhall be forgiven, if I drop a Word or two relating to the fair Sex. It is a general Remark that they are ſo unhappy as ſeldom to be found either to Spell, Write or Cypher well: And the Reaſon is very obvious; becauſe they do not ſtay at their Writing Schools long enough. A Year's Education in Writing is by many thought enough for a Girl; and by others it is thought Time enough to put them to it, when they are Sixteen or Seventeen Years of Age; whereas by

‘ ſad Experience, both theſe are found to be, the one too ſhort a Time, and the other too late. The firſt is a Time too ſhort, becauſe when they are taken from the Writing-ſchool, they generally forget what they learnt for want of Practice: And the other is too late, becauſe then they are apt to look too forward, imagine all Things will come of themſelves, without any Trouble, and think they can learn a great deal in a little Time; and when they find they cannot compaſs their Ends ſo ſoon as they would, then every little Difficulty diſcourages them. And hence it is that Adult Perſons ſeldom improve in the firſt Principles of Learning ſo faſt as younger Ones. For a Proof of theſe, I appeal to every Woman, whether I am juſt in my Sentiments or not. The Woman who has had a liberal Education this Way, knows the Advantages that ariſe from the ready Uſe of the Pen; and the Woman who has learnt little or nothing of it; cannot but lament the Want of it. Girls therefore ought to be put to the Writing-School as early as Boys, and continued in it as long, and then it may reaſonably be expected that both Sexes ſhould be alike ready at their Pen. But for want of this, how often do we ſee Women, when they are left to ſhift for themſelves in the melancholy State of Widowhood, (and what Woman knows that ſhe ſhall not be left in the like State?) obliged to leave their Buſineſs to the Management of others, ſometimes to their great Loſs; and ſometimes to their utter Ruin, when, on ‘the contrary, had they been ready at their Pen, could Spell well, and underſtand Figures, they might not only have ſaved themſelves from Ruin, but perhaps have been Miſtreſſes of a good Fortune. Hence then may be drawn the following but moſt natural Concluſion, *viz.* §The Education of Youth is of ſuch vaſt Importance, and of ſuch ſingular Uſe in the Scene of Life, that it viſibly carries its own Recommendation along with it: For on it, in a great Meaſure, depends all that we hope to be; every Perfection that a generous and well-diſpoſed Mind would arrive at: ’Tis this that ſtamps the Diſtinction of Mankind, and renders one Man preferable to another; is almoſt the very Capacity of doing well, and remarkably adorns every Point of Life.’ And as the great End of human Learning is to teach a Man to know himſelf, and thereby fit him for the Kingdom of Heaven: So he that knows moſt, conſequently is enabled to practice the beſt and become an Example to thoſe who know but little, or are quite ignorant of their Duty.

I am,

Yours and your Childrens Well-wiſher,
THOMAS DILWORTH.

To

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§ *Watts's* Eſſay.

To Mr. THOMAS DILWORTH ON HIS Compendium of ARITHMETIC INTITLED, The

School-maſter's Aſſiſtant.

WHILE ſome, ſeducive of the riſing Age,
Expoſe for Hire the lewd or factious Page,
On every Stall appear the public Peſt,
Deep Bane inſtilling in the tender Breaſt;
Thou, Friend of moral as of ſocial Truth!
Employ'ſt thy Toils to mend our growing Youth.
Thy Cares how worthy of the Good and Wiſe,
Impow'r the Embrio Genius firſt to riſe;
Make the dark Clues of Science plain to find,
And through its Mazes lead the pleaſur'd Mind.
E'en now afreſh, unweary'd in thy Pains,
For future Times thy recent Taſk remains;
By double Motives it aſſures to pleaſe,
The Youth's Inſtructor, and the Tutor's Eaſe:
From darker Forms it clears encumber'd Rules,
And Learning makes the fit delight of Schools.

Thy Labours, Friend, have found their juſt Succeſs,
And gen'ral Plaudits thy Deſert confeſs,
O may *This Work*, nor *This* be found thy laſt,
No ſordid Pride o'rlook, or Envy blaſt,
Far as our mother Tongue extends be known,
And grateful Pupils thy Aſſiſtance own.

MOSES BROWNE.

To Mr. Thomas Dilworth, *Author of the* School-maſter's Aſſiſtant.

S I R,

AS you were pleaſed to favour me with the Peruſal of Your *School-maſters Aſſiſtant* in Manuſcript, which gave me a ſenſible Pleaſure; you have thereby obliged me, in Juſtice to your Merit, to give my humble Opinion of it.—— That a Work of *this Kind* has been long wanted, admits of no Diſpute. And I muſt confeſs, that you have treated the Subject ſo methodically, laid down the ſeveral Rules ſo very plain, yet conciſe, as muſt make this Book of general Uſe and Advantage. And I heartily wiſh you may meet with equal Encouragement in the Publication of this, as you did in your excellent *New Guide* to the *Engliſh* Tongue.

I am, S I R,

London, 29th of
November,
1742.

Your ſincere Friend,
And humble Servant,

BRIGHT WHILTON.

To Mr. Thomas Dilworth, *on his* Schoolmaſter's Aſſiſtant.

S I R,

I Have peruſed with Pleaſure, Your *Schoolmaſters Aſſiſtant*, and give you my Thanks for your kind Endeavours to further the Improvement of Youth with greater Facility to the Tutor.

I am convinced, *that Piece* is well calculated to promote both, and therefore wiſh you the Succeſs due to ſo much uſeful Labour. I am,

S I R,

Well Court in
Queen-ſtreet,
13 *January,*
1742.

Your Friend and Servant,

WILLIAM COLES.

TO

Mr. THOMAS DILWORTH.

ON HIS

Treatiſe of ARITHMETIC,

INTITLED,

The School-maſter's Aſſiſtant.

SIR,

IT is univerſally allowed (in all Nations civilized) that the Inſtruction of Youth is of the greateſt Importance, the Happineſs of every Individual, and Society in general thereon depending; and that it is of two Kinds, *viz.* To form the good Man, and the good Scholar. To compleat the latter, thoſe Studies are chiefly to be purſued, which are adequate to the Diſpoſition of the Pupil, and to compleat the Man of Buſineſs he is deſigned for: But I do not know any Buſineſs that can be well executed without ARITHMETIC. This therefore claims a firſt Place, and the due Care of a Maſter, to inculcate and explain the Rudiments, which will not only ground the *Tyro*, but alſo give him ſome Glances of thoſe Beauties and Uſes, he may expect from his preſent Labours: Every Help then, that may gain the Maſter Time in the Diſcharge of his Duty, will (in conſequence) add to the Improvement of his Scholars: For which Uſe and Purpoſe, that this Book is well adapted, (having peruſed it ſome Time ago in Manuſcript) is the ingenuous Opinion of,

SIR,

Your reſpectful Friend and Servant,

WILLIAM MOUNTAINE.

Gainſford-Street, Shad-Thames, Southwark,
the 9th *of May*, 1743.

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THE

EXPLICATION

Of ſome MARKS uſed in this COMPENDIUM.

= TWO parallel Lines are the Marks of *Equality*; as, 12 *oz.* = 1 ℔. ſignifies that 12 Ounces are *equal* to 1 Pound.

+ Saint *George*'s Croſs ſignifies *more*, or *Addition*; as, 4+2=6: *i. e.* 4 *more* 2 is *equal* to 6.

— A ſtraight Line ſignifies *leſs*, or *Subtraction*; as, 4—2=2; *i. e.* 4 *leſs* 2, is *equal* to 2.

× Saint *Andrew*'s Croſs denotes *Multiplication*; as, 4×2=8: *i. e.* 4 *multiplied* by 2, is *equal* to 8.

÷ A Line between two Points, is the Sign of *Diviſion*; as, 4÷2=2: *i. e.* 4 *divided* by 2, is *equal* to 2.

)(The reverſe Parentheſis denotes *Diviſion* alſo; as, 2)4(2: *i. e.* 4 *divided* by 2, is *equal* to 2.

$\frac{7}{3}\frac{6}{2}$ Numbers placed in a fraction like manner, do likewiſe denote *Diviſion*; the lower Number being the *Diviſor*, and the upper Number the *Dividend*.

: : Four Points, ſet in the middle of four Numbers, denote them to be proportional to one another, by the *Rule of Three*: as 2 ·· 4 : : 8 ·· 16 : that is, as 2 is to 4, ſo is 8 to 16.

lb	Pounds,
℥	Ounces,
ʒ	Scruples,
℈	Drams,
gr.	Grains.

$\overline{2+3}\times5=25$. Signifies that the Sum of 2 and 3, *multiplied* by 5, is *equal* to 25.

$\overline{3-2}\times5=5$, Signifies, that the Difference between 3 and 2, *multiplied* by 5, is *equal* to 5.

$\surd$ or $\surd q$. Prefixt to any Number, ſuppoſes that the *Square Root* of that *Number* is required. Sometimes it is the Sign of *Irrationality*, and ſignifies that the *Square-Root* of ſuch a *Number* can never be truly found.

$\surd c$. Prefixt to any Number, ſuppoſes that the *Cube Root* of that *Number* is required. Sometimes it is the Sign of *Irrationality*, and ſignifies that the *Cube-Root* of ſuch a *Number* can never be truly found.

$3aa+3a$, Signifies 3 times the *Square* of a, *more* 3 times a.

$3aae+3eea+eee$, Signifies 3 times the *Square* of a, *multiplied* by e, *more* 3 times the *Square* of e, *multiplied* by a, *more* the *Cube* of e, as in the *Cube-Root*.

THE
School-maſter's Aſſiſtant.

PART I.

Of ARITHMETIC *in Whole Numbers.*

The INTRODUCTION.

Of Arithmetic in general.

Q. WHAT *is* Arithmetic?

A. *Arithmetic* is the Art or Science of computing by Numbers, either Whole or in Fractions

Q. *What is* Number?

A. *Number* is one or more Quantities, anſwering to the Queſtion, *How many?*

Q. *What is Arithmetic in* Whole Numbers?

A. Arithmetic in *Whole Numbers* or *Integers*, ſuppoſes its Numbers to be intire Quantities, and not divided into Parts.

Q. *What is Arithmetic in* Fractions?

A. Arithmetic in *Fractions*, ſuppoſes its Numbers to be the Parts of ſome intire Quantity.

Q. *In what manner do you conſider* Arithmetic, *as* Art *or* Science?

A. In *Theory* and *Practice*.

Q. *What is* Theoretical Arithmetic?

A. *Theoretical Arithmetic* conſiders the Nature and Quality of Numbers, and demonſtrates the Reaſon of practical Operations. And in this Senſe Arithmetic is a *Science*.

Q. *What is* Practical Arithmetic?

A. *Practical Arithmetic* is that which ſhews the Method of working by Numbers, ſo as may be moſt uſeful and expeditious for Buſineſs. And in this Senſe Arithmetic is an *Art*.

Q. *What is the Nature of all* Arithmetical Operations?

A. The Nature of all *Arithmetical Operations* is, by ſome Quantities that are given, to find out others that are required.

Q. *Which are the fundamental Rules in* Arithmetic?

A. Theſe five; *Notation, Addition, Subtraction, Multiplication,* and *Diviſion.*

Of

BIBL CANT. ACAD.

Of NOTATION.

Q. WHAT *is* Notation?

A. It is the *Art* of expreſſing *Numbers* by certain *Characters* or *Figures.*

Q. *What is the Uſe of* Notation?

A. *Notation* teaches to read and write Numbers by their true Value.

Q. *How many ſorts of* Characters *or* Figures, *are Numbers uſually expreſſed by?*

A. Two, *viz.* the *Arabic Figures*, and the *Latin Letters.*

Q. *How are the* Arabic Figures *expreſſed?*

A. The *Arabic Figures* are thus expreſſed; *One* 1, *Two* 2, *Three* 3, *Four* 4, *Five* 5, *Six* 6, *Seven* 7, *Eight* 8, *Nine* 9, *Nought* or *Cypher* 0. And this is the *Notation* or reading and writing of every ſingle Figure.

Q. *How far may the Uſe of theſe* Figures *be extended?*

A. Theſe Ten *Characters* or *Figures* may be uſed to expreſs all manner of Numbers, from the leaſt to the greateſt, that can be conceived, even without End.

Q. *How many* Figures *are ſufficient to expreſs moſt ordinary Concerns?*

A. Nine; and therefore the Table of *Notation* commonly extends no farther than to *nine* Places.

Q. *Why does it conſiſt of* nine *Places rather than of* eight *or* ten?

A. Becauſe they make up three *even Periods.*

Q. *What do you mean by a* Period?

A. A *Period* is a Quantity expreſſed by three Figures, whereof the firſt to the right Hand ſignifies ſo many *Units* or or ſingle Things; the ſecond ſo many *Tens*; and the third ſo many *Hundreds.*

Q. *Why are three Figures called a* Period?

A. Becauſe if the Number be increaſed above *three* Places there is ſtill the ſame periodical Return of the Value of thoſe Places, and every *third* Figure to the left Hand will always be *Hundreds*, if it be never ſo far extended.

Q. *Is an* Unit *or* One *a Number?*

A. An *Unit* is a Number, becauſe it may properly anſwer the Queſtion, *How many?*

Q. *Give an Example or two.*

A. How many *Gods* do we believe? The Anſwer is, *One.* How many *Sundays* in the compaſs of a Week? Anſwer, *One.*

Q. *In what nature or proportion of Value, do* Numbers *increaſe from the* Units *Place, to the Left Hand?*

A. By *Tens.*

Q. *How muſt they be read?*

A. From the Left to the Right Hand.

Q. *If* two Figures *are given to be read together, how muſt they be valued?*

A. The firſt Figure towards the Right Hand is *Units*, and the next to that is ſo many *Tens*; as 89, *Eighty nine*. Where 2 is the Place of *Units*, and 8 is the Place of *Tens*; for 8 *Tens* are properly called *Eighty*.

Q. *If* three Figures *or a* whole Period *be given, how is it to be valued?*

A. Beginning at the laſt Figure on the Right Hand, I value them *Units*, *Tens*, *Hundreds*; as 789, *Seven Hundred Eighty* and *Nine*.

Note, *As every* third Figure *from the Place of* Units, *bears the Name of* Hundred: *So for any great Sum to be diſtinguiſhed into* Periods (*as in the following* Tables) *will be of good Uſe to the Learner, in the eaſier valuing and expreſſing that Sum.*

TABLE I.

Third Period			Second Period			Firſt Period		
C Millions	*X Millions*	*Millions*	*C Thouſands*	*X Thouſands*	*Thouſands*	*Hundreds*	*Tens*	*Units*
								9
							8	9
						7	8	9
					9	7	8	9
				8	9	7	8	9
			7	8	9	7	8	9
		9	7	8	9	7	8	9
	8	9	7	8	9	7	8	9
7	8	9	7	8	9	7	8	9
9	0	9	0	0	9	0	8	0

TABLE II.

Third Period			Second Period			Firſt Period		
C Millions	*X Millions*	*Millions*	*C Thouſands*	*X Thouſands*	*Thouſands*	*Hundreds*	*Tens*	*Units*
								4
							7	3
						9	6	5
					3	4	7	3
				4	8	9	1	3
			7	3	1	2	3	6
		3	1	2	7	1	4	8
	4	3	1	9	2	7	6	4
5	7	3	1	2	9	8	4	2
1	1	1	0	0	1	1	0	1

Note, See the Notation of Numbers by *Latin Letters*, in the *New Guide to the* Engliſh Tongue, p. 111 *Jackſon's* Edit.

EXAMPLES *for Practice.*

Write down in proper Figures the following Numbers, viz

Ten,—one hundred,——one thouſand,—— one million

Twenty nine.

Three Hundred and forty eight.

Seven Thouſand, two Hundred and twenty ſix.

One Thouſand, three Hundred and ninety.

Nineteen Thouſand, ſeven Hundred and twenty eight.

Four Hundred and twenty ſeven Thouſand, three Hundred and ninety ſix.

Nine Hundred and forty-two Thouſand, ſeven Hundred.

Four Millions, ſeven Hundred and eighty-nine Thouſand, three Hundred and twenty eight,

Seven Millions, nine hundred and forty-two Thouſand four Hundred and ſeventy-five.

Twenty ſix Millions, three hundred and fourteen Thouſand, one Hundred and ninety five.

One Hundred and ninety-ſeven Millions, four Hundred and thirty-ſix Thouſand, one Hundred and ninety one.

Seven Hundred and fourteen Millions, one Hundred and nineteen Thouſand, ſeven Hundred and four.

Six Millions, ſix thouſand, ſix hundred and ſix.

Seventy Millions, ſeventy thouſand and ſeventy.

Fifty five Hundred and fifty five.

Of ADDITION.

Q. WHAT *is the Uſe of* Addition?

A. *Addition* teacheth to bring ſeveral particular Numbers into one Total Sum.

Q. *How many ſorts of* Addition *are there?*

A. Two, *viz. Simple* and *Compound.*

Of ſimple ADDITION.

Q. *What is* Simple Addition?

A. *Simple* or *Single Addition,* is the adding of ſeveral Numbers together, whoſe Signification is the ſame; as 16 Yards and 18 Yards, make 34 Yards.

Q. *If ſeveral Numbers are given to be added in one Sum, how are they to be placed?*

A. They muſt be placed in ſuch a manner, that *Units* may ſtand under *Units, Tens* under *Tens,* &c. *Pounds* under *Pounds, Shillings* under *Shillings,* &c.

Q. *How do you prove* Addition?

A. The beſt way of proving *Addition* is to begin at the Top of the Sum, and reckon the Figures downward, in the ſame manner that they were added upwards; and if the ſecond Line of Sum Total be equal to the firſt, it is right.

EXAMPLES *for Practice.*

£.	*Yds.*	*Gals.*	*Tons*	*Hhds.*	*lb.*
4	43	764	3746	47476	461743
7	17	147	7416	73712	761710
3	19	384	4146	31819	476312
2	14	736	7198	31243	126712
1	37	197	3173	71208	710748
7	46	473	4731	70956	341381
6	23	382	1262	81461	704714
4	59	769	4731	31269	312624
7	94	367	7169	74196	781462

Miles	*Leagues*	*Years*
4734736	16431734	347312484
3474312	71267374	168126302
4161322	12612714	718126191
7369138	31371261	721618191
3142618	74147312	312134716
4731216	47312614	171216198
4713147	47167471	312614712
7126981	31184712	312804797
3712612	31216126	170614712

Of Compound ADDITION.

Q. *What is* Compound Addition?

A. *Compound Addition* is the adding of ſeveral Numbers together, having diverſe Denominations.

1. *Of* MONEY.

Q. *Which are the Parts and Denominations of* Engliſh Money?

A. 4 Farthings make a Penny.
12 Pence —— a Shilling.
20 Shillings —— a Pound *Sterling*

Q. *Are there no other Names of* Money *uſed in* England?

A. Yes; ſuch as,

		£.	s.	d.	Val. in Irel. £.	s.	d.
A *Moidore*	=	1	7	0	1	9	3
A *Guinea*	=	1	1	0	1	2	9
A *Half Guinea*	=	0	10	6	0	11	4½
A *Crown*	=	0	5	0	0	5	5
A *Half Crown*	=	0	2	6	0	2	8½

There are alſo ſeveral ſmaller Pieces which ſpeak their own Value; as, a *Six-pence*, *Four-pence*, *Three-pence*, *Two-pence*, *Penny*, *Half-penny*, *Farthing*.

But the Silver Pieces of *Four-pence*, *Three pence*, *Two-pence*, and a *Penny*, are ſeldom in Uſe now.

Note, *The following Pieces were formerly in Uſe*; as,

		£.	s.	d.
A *Carolus*	=	1	5	0
A *Jacobus*	=	1	3	0
A *Mark*	=	0	13	4
An *Angel*	=	0	10	0
A *Noble*	=	0	6	8

Note, *The Imaginary Money, or Money of Account uſed in* Ireland, *is the ſame with that in* England, viz. *Pounds, Shillings, Pence and Farthings, except that only* 1l. *in* England *is equal to or worth* 1l. 1s. 8d: *in* Ireland, *and* 1s. *in* England *is* 1s. 1d. *in* Ireland, *yet both are divided in the ſame manner*, viz. *the Pound into* 20s. *the Shilling into* 12d. *and the Penny into* 4 qrs.

Q. *Are there not ſome* Tables *that may be learned by Heart?*

A. Yes; theſe following called *Pence Tables.*

d.		s.	d.	s.		d.
20	=	1	8	2	=	24
30	=	2	6	3	=	36
40	=	3	4	4	=	48
50	=	4	2	5	=	60
60	=	5	0	6	=	72
70	=	5	10	7	=	84
80	=	6	8	8	=	96
90	=	7	6	9	=	108
100	=	8	4	10	=	120
110	=	9	2	11	=	132
120	=	10	0	12	=	144

Note 1. *Tho' I ſay the foregoing* Tables may *be learned by Heart, I do not ſay they* muſt; *for then by the ſame Rule, it would be neceſſary to have* Tables *to every* Rule *in* Addition, *which no Body uſes, and not every one the* Pence Tables, *becauſe when they are learn'd never ſo perfectly their* Uſe *extends no farther than* Money; *and therefore they may very well be omitted, and a better* Method *ſubſtituted in their room, I mean that of* Pointing, *which, I am ſure is both* eaſier *and* ſafer, *to Beginners eſpecially. However, I choſe to ſet them down in their Place, that they who approve of them may uſe them; and they who do not can eaſily omit them.*

Note 2. *As all the Parts of* Addition *are built upon the ſame* Reaſon: *So the* Method *of* Pointing *may ſerve as a general* Rule, *when any* Denomination *is to be added.*

Note 3 When Scholars are brought to know what Addition is, they may be taught in Pence to point at 60 or 120, calling every 60 Pence five Shillings, or 120 Pence 10 Shillings; But in Shillings, the Number of Tens in the Units place may be added to the Number of Tens in the place of Tens, and half of the Sum of the Tens carried to the Place of Units in the Pounds (not omitting to ſet down the Surplus Shillings in the Place of Shillings.) See *Gough*'s Arithmetick, p. 54.

EXAMPLES.

£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
4	3	6	1	4	3	4	1	6½	14	12	1
1	7	8¼	3	8	1¼	1	2	7	17	11	2¼
2	7	4	1	2	6	3	1	4	19	12	1½
1	9	4¼	3	4	7½	3	3	6	16	13	1¼
2	1	3¼	1	2	6	1	4	1	12	10	6
1	2	1	3	1	8¼	3	1	2	14	12	7¼
4	7	6½	7	1	6	1	4	8½	19	13	4
3	1	9	4	1	7¾	3	1	1	12	11	6

£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
19	13	4	47	12	10	21	13	10½	12	13	10
12	11	6	17	10	11	31	11	11¼	71	16	8
17	14	1½	17	19	4½	47	12	10¼	19	4	6¼
19	13	4½	31	12	6	19	11	4	12	3	1
12	11	6	11	19	4	31	12	6½	26	1	6½
19	13	1¾	12	12	6¾	12	11	4¾	31	11	1
16	12	1	11	13	1	37	12	4	14	12	6
19	12	4¼	12	11	2¼	19	11	3	19	18	7¾

£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.
44	12	6¼	21	11	11½	47	12	6½	47	11	3¼
31	18	1½	16	12	5	16	19	11¼	31	17	3
47	12	4	11	9	10½	17	12	10¼	17	13	11¼
14	12	10¾	16	12	4¼	19	12	10	18	14	10½
16	14	11	44	1	10	17	12	11¾	16	11	11
19	12	2	17	14	11¼	17	19	4½	17	14	3½
16	11	3	71	3	8¾	47	13	6	11	18	6
17	12	1¼	16	1	4	72	18	6	17	17	3½

A Mercer's Bill.

Bought of *Iſaac Simmons*, *May* 7, 1775.

		s	d.		£.	s.	d.
9 *Yards of Silk* — ——	at	14	6	*per Yd.*	6	10	6
12 *Yards of flower'd Silk* —	at	16	8	——	10	0	0
16 *Yards of Sarſenet* —	at	6	9	——	5	8	0
10 *Yards of Sattin* ——	at	9	6	——	4	15	0
15 *Yards of Brocade* ——	at	10	8	——	8	0	0
11 *Scarves* — ——	at	2	0	*each*	1	2	0
14 *Yards of Genoa Velvet* —	at	17	4	*per Yd.*	12	2	8
10 *Yards of Luſtring* ——	at	5	2	——	2	11	8
Sum							

A Woollen

A Woollen Draper's Bill.

Bought of *George Claſſon June* 19, 1775.

		s.	d.		£.	s.	d.
16 *Yards of Drugget*	*at*	7	0	*per Yd.*	5	2	0
12 *Yards of Broad Cloth*	*at*	15	0	——	9	0	0
9 *Yards of Black Cloth*	*at*	16	5	——	7	7	9
10 *Yards of Shalloon*	*at*	1	8	——	0	16	8
15 *Yards of Serge*	*at*	1	10	——	1	7	6
7 *Yards of fine Spaniſh Black*	*at*	18	0	——	6	6	0
16 *Yards of Frieze*	*at*	4	6	——	3	12	0
12 *Yards of ſuperfine Scarlet*	*at*	18	0	——	10	16	0
				Sum			

A Linnen Draper's Bill.

Bought of *Robert Middleton, July* 17, 1775.

		s.	d.		£.	s.	d.
26 *Ells of Dowlas*	*at*	1	4	*per Ell*	1	14	8
18 *Ells of Holland*	*at*	4	0	——	3	12	0
12 *Ells of Diaper*	*at*	1	0	——	0	12	0
12 *Damaſk Napkins*	*at*	2	0	*each*	1	4	0
20 *Yards of Printed Linnen*	*at*	2	0	*per Yd.*	2	0	0
10 *Yards of Cambrick*	*at*	12	0	——	6	0	0
10 *Yards of Muſlin*	*at*	7	0	——	3	10	0
14 *Yards of Canvas*	*at*	3	4	——	2	6	8
				Sum			

A Grocer's Bill.

Bought of *John Emerſon, May* 19, 1775.

		s.	d.		£.	s.	d
8 ℔ *of Raiſins of the Sun*	*at*	0	5	*per* ℔	0	3	4
15 ℔ *of Malaga Raiſins*	*at*	0	4½	——	0	5	7½
10 ℔ *of Currants*	*at*	0	6½	——	0	5	5
11 ℔ *of Sugar*	*at*	0	4½	——	0	4	1½
2 *Sugar Loaves, wt,* 15 ℔	*at*	0	9	——	0	11	3
13 ℔ *of Rice*	*at*	0	3	——	0	3	3
5 ℔ *of black Pepper*	*at*	1	6	——	0	7	6
10 *Oz. of Cloves*	*at*	0	10	*per oz.*	0	8	4
				Sum			

A Cheeſemonger's Bill.

Bought of *Daniel Bambrick, July* 17, 1775.

			s.	d.		£.	s.	d.
3	*Gloceſterſhire Cheeſes,*	*wt.* 24℔ — *at*	0	4	*per* ℔	0	8	0
1	*Cheſhire* ———	*wt.* 28℔ — *at*	0	4	——	0	9	4
3	*Warwickſhire* ———	*wt.* 23℔ — *at*	0	3	——	0	5	0
½	*Firkin of Butter* —	*wt.* 28℔ — *at*	0	6	——	0	14	0
1	*Flitch of Bacon* —	*wt.* 6*Sto* — *at*	4	0	*p. Sto.*	1	4	0
7	℔ *of Cambridge Butter* —	— *at*	0	6	*per* ℔	0	3	6
9	℔ *of New Cheeſe* — —	— *at*	0	4	——	0	3	0
7	℔ *of Cream Cheeſe* — —	— *at*	0	6	——	0	3	6
					Sum			

A Milliner's Bill.

Bought of *Jane Walker, Auguſt* 28, 1775.

			s.	d.		£.	s.	d.
15	*Yards of ſilver Ribbon* —	*at*	2	3	*p. Yd.*	1	13	6
3	*Pair of fine Kid Gloves* —	*at*	2	0	*p. pair*	0	6	0
6	*Dozen of Iriſh Lamb Ditto* --	*at*	1	0	——	3	12	0
6	*Sarſenet Hoods* — —	*at*	4	6	*each*	1	7	0
15	*Fans, India Mount* —	*at*	4	0	——	3	0	0
3	*Setts of Knots* — — —	*at*	2	0	*p. Sett*	0	6	0
16	*Yards of fine Lace* ——	*at*	10	0	*p. Yd.*	8	0	0
20	*Pieces of Bobbin* ——	*at*	0	6	*p. piece*	0	10	0
					Sum			

A Carpenter's Bill.

Mr. *John Law* Dr. to *Joſeph Doyle,* for Carpenter's Work and Materials, *viz.*

1775.				s.	d.		£.	s.	d.
May	3	For 30 *Feet of Fir Timber,*	*at*	0	3	*p. Foot*	0	7	6
	5	— 18 *whole Deals at* —	*at*	1	6	*each*	1	7	0
		— 16 *ſlit Deals* —	*at*	1	0	——	0	16	0
		— 4 *Hundred of ſixpenny Nails*				——	0	2	0
		— 3 *Hundred of tenpenny Nails*				——	0	2	6
		— 6 *Hundred of Brads* ——				——	0	1	6
		— 18 *Days Work* ——	*at*	3	0	*p. Day*	2	14	0
						Sum			

A Baker's Bill

Mr. *Thomas Marriot* Dr. to *James Langan*, viz.

1775.		£.	s.	d.
Feb. 4	*For a Peck of Bran*	0	0	3
	— *a fine Peck Loaf*	0	1	8
	— *a Peck of fine flour*	0	1	0
13	— *a Buſhel of Pollard*	0	1	0
17	— *ſmall Bread*	0	0	2½
	— *Yeſt*	0	0	1
	— *a half Peck ſecond Loaf*	0	0	9
20	— *a Quartern ſecond Loaf*	0	0	4½
	Sum			

A Bill of Diſburſement.

1775.		£.	s.	d.
Feb. 17	*Laid out in Lamb, ſeven Groats*			
18	— *in Sallad, five Farthings*			
21	— *in Beef, nineteen Pence Halfpenny*			
Mar. 7	— *in Parſnips, three Halfpence*			
8	— *in Potatoes, a Groat*			
9	— *in Candles, ſeven Groats and three Pence*			
10	— *in Butter and Cheeſe, eight and twenty Pence*			
12	— *in Bread, three and twenty Pence*			
	Sum			

Suppoſe I am indebted.

	£.	s.	d.
To A, *twenty Pounds, ſeven Shillings and four Pence Farthing*			
— B, *nineteen Pounds, thirteen Shillings and ten Pence Halfpenny*			
— C, *twelve Pounds, fourteen Shillings and ſeven Pence three Farthings*			
— D, *twenty ſix Pounds ſeventeen Shillings and four Pence Farthing*			
— E, *twenty eight Pounds, thirteen Shillings and ſeven Pence three Farthings*			
— F, *twenty one Pounds, fifteen Shillings and five Pence Halfpenny*			
— G, *five Pounds, ſix Shillings and ſeven Pence Farthing*			
How much is the Debt? Sum			

2. *Of* TROY-WEIGHT.

Q. *Which are the Denominations of* Troy-Weight
A. 24 Grains —— make 1 Penny-weight,
20 Penny-weights —— 1 Ounce.
12 Ounces —— 1 Pound.

Q. *What ſort of Things are weighed by this Weight.*

A. Gold, Silver Jewels, Electuaries, Bread, and all Liquors.

Q. *What is the Standard for* Gold?

A. 22 *Carrats* of fine Gold, and 2 *Carrats* of Copper being melted together are eſteemed the true Standard for *Gold* Coin.

Q. *What is a* Carrat?

A. A *Carrat* is not any certain Quantity or Weight but the twenty-fourth Part of any Quantity or Weight.

Q. *What is the Standard for* Silver *in* England?

A. 11 *oz.* 2*dwts.* of fine Silver, and 18 *dwts.* of Copper being melted together, are eſteemed the true Standard for *Silver* Coin; called *Silver ſterling.*

Note, *The Ounce of* Silver *being valued at* 5 Shillings, *one Penny-weight will be valued at three Pence, and the Grain at half a Farthing.*

EXAMPLES.

Oz.	*dwt.*	*gr.*	*Oz.*	*dw*	*gr.*	*lb.*	*oz.*	*dw.*	*gr.*	*lb.*	*oz.*	*dw.*	*gr.*
7	10	12	7	13	12	4	10	12	11	7	10	12	10
6	11	11	6	11	14	3	11	16	12	3	4	16	13
5	16	11	9	12	17	1	4	16	19	3	7	12	11
4	17	10	4	16	13	3	3	11	17	1	1	18	16
1	12	16	7	11	14	4	1	16	14	3	11	16	12
7	12	18	6	19	12	3	3	16	11	4	3	16	21
9	16	19	7	13	16	7	11	16	10	3	4	13	11
8	4	16	3	19	14	6	4	13	15	3	7	18	19
4	16	10	5	9	8	5	11	14	13	9	8	19	9
9	4	8	6	12	13	9	10	15	14	7	11	12	8

3. *Of* AVOIRDUPOIS-WEIGHT.

Q. *Which are the Denominations of* Avoirdupois-Weight?

A. 16 Drams make an Ounce.
16 Ounces —— a Pound.
28 Pounds —— a Quarter of an Hundred Weight.
4 Quarters —- one Hundred Weight, or 112 Pounds
20 Hundred Weight one Ton

Q. *What is the Uſe of* Avoirdupois Weight?

A. *Avoirdupois-Weight* is uſed in weighing any Thing of a coarſe and droſſy Nature as all Grocery and Chandlers Wares, and all Metals but Silver and Gold.

Q. *What is the Difference between a Pound* Avoirdupois *and a Pound* Troy?

A. The Pound *Avoirdupois* is equal to 14*oz.* 11*dwts.* 15*gr.* and an half *Troy.*

Q. *What other Denominations are in this Weight?*

A. There are ſeveral other Denominations in *Avoirdupois-Weight*, in ſome particular Goods, and others only cuſtomary in ſome particular Places; as appears by the following Table.

TABLE.

	℔		℔
A Firkin of Butter is —	56	—— Gunpowder is —	112
—— Soap is ——	64	—— Raiſins is — —	112
A Barrel of Pot-aſh is	200	A double Barrel of Anchovies is	60
—— Anchovies is —	30	A Puncheon of Prunes is 10 *C.* or 12 *C.*	
—— Candles is —	120	A Fother of Lead is 19*C.* 2*qrs*	
—— Figs, from — 98 to 2 *C.* 3 *qrs.* —	98	A Stone of Iron or Shot is	14
—— Soap is ——	256	A Wey in *Suffolk* is 32 Cloves, or —	256
—— Butter is —	224	—— *Eſſex* is 42 Clov. or	336
—— Butchers Meat is	8	*For Wool.*	
A Gallon of Train Oil is	$7\frac{1}{2}$	A Clove is —— ——	7
A Faggot of Steel is —	120	A Stone is — —— —	14
A Burden of Gad-Steel or 9 Score ——	180	A Todd is — — —	28
A Quintal of Fiſh in *Newfoundland* is	100	A Wey is 6 Todd and 1 Stone, or —	182
A Stone of Glaſs is —	5	A Sack is 2 Weys, or	364
A Seam of Glaſs is 24 Stone, or —	120	A Laſt is 12 Sacks,	4368
For Cheeſe and Butter.			
A Clove or half Stone is	8		

Examples.

EXAMPLES.

T.	*C.*	*qr.*	*lb.*	*C.*	*qr.*	*lb.*	*lb.*	*oz.*	*dr.*	*lb.*	*oz.*	*dr.*
7	11	1	16	17	1	12	14	10	12	12	11	10
1	12	3	11	16	2	11	16	12	11	17	12	10
3	4	1	17	14	1	12	19	12	12	14	12	13
3	1	2	12	16	3	19	17	12	13	16	12	11
7	11	1	11	19	1	12	14	11	10	19	12	11
6	3	2	13	16	3	18	16	15	14	17	13	4
3	1	2	20	12	1	18	13	11	14	16	11	3
4	1	3	26	16	3	19	17	12	10	21	10	7

Of AVOIRDUPOIS-WEIGHT.

1. It was enacted, by 2 *Ann. Seſſ* 2. *Cap.* 14. that there ſhould be one *Weight* throughout *Ireland* for weighing all ſorts of Merchandizes between Buyer and Seller, according to the Pound *Avoirdupois-Weight*, except Bread, Gold, Silver, Druggiſt's and Apothecaries Wares: And all Merchandizes ſhall be weighed by Balance, ſo that the Tongue of the Balance be even, without bowing to one Side or the other, or by putting a Hand or Foot to touch or diſorder the ſame.

Note, *By the above Statute, white Salt is to be ſold by Weight and where the Quantity bought or ſold exceeds a Buſhel,* 56℔ *is to be eſteemed a Buſhel, and ſo in Proportion for a greater Quantity: and by the ſaid Statute, Flour, Meal, Cutlings, or any other Sort of ground Corn, ſold by retail, are to be ſold by Weight, and not otherwiſe.*

2. But by 1 *Geo.* 2. *Cap.* 16 and 7 *Geo.* 2. *Cap.* 15. Bread is to be weighed by *Avoirdupois-Weight*; and according to this Weight the aſſize of Bread is now given weekly to the Bakers, by the Magiſtrates of all Cities and great Towns in *Ireland*; ſave that the Ounce is divided only into eight Drachms.

3. By 7 *Geo.* 2. *Cap.* 15 it was appointed, That from the 29th Day of *September*, 1734, all Wheat Rye, Meaſlin, Peaſe, Beans, Barley, Bere, Oats, Shelling, Cutlings Meal, Flour and Malt, ſhall be ſold by Weight, according to the *Avoirdupois* Pound, and not by Meaſure, 14℔ to a *Stone*,

8 Stone to *C wt.* and 20 *Cwt.* to *Tun*; to be *Standing Weight*, and all Bargains for ſelling otherwiſe, or making any Allowance, to be void.

And by the ſaid Statute the Number of *Stones* to be allowed to the Quarter of each kind of Grain (of the Produce of this Kingdom) was firſt ſettled; but ſince that Time it appears the Appointment has been altered; for at preſent they paſs according to the following Regulations, whether the Corn, Grain, *&c.* be deſigned for home Conſumption, Export, or Importation.

Oats and Malt at 24 Stone
Barley and Bere at 32 Stone
Rye, Meaſlin, Wheat, Peaſe, and Beans are 40 Stone
} to the Quarter, which is two Barrels.

Potatoes, Hay and Straw are likewiſe ſaid to be ſold by Weight.

The Load of Straw, *&c.* is to weigh 4 *Cwt.*

4. Caſks of Butter, by 12 *Geo.* 1. *Cap.* 5 are not to weigh leſs than half a *C. wt.* nor to exceed 3 *C. wt.* The Tare allowed for the Caſk is to be branded on it: 4 ℔ *per C wt.* is to be allowed for *Soakage*, and branded as the Tare is.

5. Render'd Tallow is frequently made up and ſold in large Caſks, tho' it is ſaid to be under much the ſame Regulations as Butter; but in buying rough Tallow from Butchers, in many Places the Chandlers take 16 ℔ to the *Stone*, and in ſome others 15 ℔.

6. By 8 *Geo.* 1. *Cap.* 7. it was aſcertained thus: Every Barrel of Beef for Export or Sale, is not (in Gauge) to be under 29 or above 30 Gallons; and the Half Barrel not to be under 14½ or above 15 Gallons: By which Regulation each Barrel will contain 2 *Cwt.* of Neat Beef, nearly, and the Half Barrel 1 *C. wt.* agreeable to 2 *Ann Seſſ.* 1 *Cap.* 15. wherein it was appointed, that the Barrel of Beef and Pork, ſalted and packed up for Exportation, ſhould contain 2 *C. wt.* of Neat Beef, *&c. Avoirdupois-Weight* and the Half Barrel 1 *C. wt.*

Of WOOL.

WOOL is weighed in *Ireland* by *Hundreds*, *Quarters* and *Pounds*, *Avoirdupois-Weight*; but the Price to Buyers is computed by the *Stone*, containing 16 *Pounds*, or

7 *Stone* to the *C. wt.* and Buyers have an Allowance of 8 ℔ for every 3 *C. wt.* beſides the Draught of the Beam, when they pay for *Wool* in the Groſs.

Note 1. WOOLL *is commonly marked on the Outſide of the Bag, with the firſt Letters of the owners Name, before it is ſent to Market.*

2. *A Ball of combed* Wool *weighs* $1\frac{1}{2}$ ℔, *and an Hundred of* Worſted *is* 100 *Skains.*

4. *Of* APOTHECARIES WEIGHT.

Q. *Which are the Denominations of* Apothecaries-Weight?

A. 20 Grains — make a Scruple.
3 Scruples —— a Dram.
8 Drams —— an Ounce.
12 Ounces —— a Pound.

Q. *What is the Uſe of* Apothecaries-Weight.

A. *Apothecaries-Weight* is ſuch as their *Medicines* are compounded by.

Note 1. *The* Apothecaries *mix their* Medicines *by this Rule, yet buy and ſell their Commodities by* Avoirdupois-Weight.

Note 2. *The* Apothecaries Pound and Ounce, *and the* Pound and Ounce Troy *are the ſame, only differently ſubdivided.*

EXAMPLES.

℔	℥	ʒ	℈	*gr.*
3	11	7	2	19
1	3	4	1	3
0	1	3	1	2
1	2	6	2	1
2	1	3	1	2
1	2	4	0	1
7	10	3	1	6
1	7	6	1	5

℔	℥	ʒ	℈	*gr.*
7	1	3	1	0
0	1	2	1	4
7	3	4	1	2
6	1	1	2	1
0	0	3	2	7
0	1	0	0	0
0	1	2	0	0
0	3	7	2	19

℔.	℥	ʒ	℈	*gr.*
7	3	1	2	11
6	2	7	1	14
3	7	2	1	11
1	3	1	0	0
2	1	2	1	2
1	3	1	2	1
4	3	1	2	1
7	3	2	1	3

Of LONG-MEASURE.

Q. *Which are the Denominations of* Long Meaſure?

A. 3 Barley Corns in length make an Inch.
4 Inches — — an Hand.
12 Inches — — a Foot.
3 Feet — — a Yard.
6 Feet — — a Fathom.
$5\frac{1}{2}$ Yards — — an *Engliſh* Perch.
7 Yards — — an *Iriſh* Perch.
40 Poles or Perches a Furlong.
8 Furlongs — — a Mile.
3 Miles — — a League.
$69\frac{1}{2}$ *Engliſh* Miles a Degree.

Note, *A* Degree of a great Circle of the Earth,— always conſiſts of 60 Geographical Miles which are equal to $69\frac{1}{2}$ *Engliſh* or $54\frac{6}{10}$ *Iriſh* Miles.

Q. *What is the Uſe of* Long Meaſure?

A. To meaſure Diſtance of Places, or any Thing elſe, where *Length* is conſidered, without regard to the Breadth.

Q. *Is the* Pole *or* Perch *always of the ſame Length?*

A. No.

Q. *What is the Difference?*

A. Five Yards and a half, are the Statute Meaſure in *England* for a *Pole* or *Perch*; but for Fens and Woodlands, it is cuſtomary to reckon 18 Feet to the Pole; and for Foreſts 21 Feet.

Q. *What is the Uſe of a* Hand?

A. It is uſed to meaſure Horſes.

Q. *What is the Uſe of a* Fathom?

A. It is uſed in meaſuring of Depths.

EXAMPLES.

M.	*f.*	*p.*	*Yds.*	*f.*	*in.*	*Le.*	*m.*	*f.*	*p.*	*Yds.*	*f.*	*in.*	*bc.*
17	7	19	14	2	7	17	2	6	14	16	1	0	0
16	1	14	16	0	4	12	1	1	18	14	2	10	1
19	3	16	19	1	10	15	2	1	16	17	1	4	2
17	4	19	16	2	4	19	2	7	11	13	2	11	1
12	1	11	14	2	5	19	0	4	31	16	1	7	2
18	3	16	14	2	1	17	2	1	12	17	1	4	1
19	7	14	31	1	3	12	1	2	17	19	2	6	2
16	6	26	11	0	1	17	1	1	14	19	2	1	1

6. *Of* CLOTH-MEASURE.

Q. *Which are the Denominations of* Cloth Meaſnre?

A. 2 Inches and a Quarter make 1 Nail.
4 Nails make a Quarter of a Yard = 9 Inches.
4 Quarters = one Yard.
3 Quarters of a Yard make a Flemiſh Ell.
5 Qnarters of a Yard make an Engliſh Ell.

Note 1. *The* Yard *is uſed in meaſuring all ſorts of* Woollen Cloths, wrought Silks, *moſt* Linens, Tape *and* Gartering.

2. *The* Ell Engliſh *is uſed only in meaſuring ſome particular* Linens, *called* Hollands.

3. *The* Ell Flemiſh *is uſed in meaſuring of* Tapeſtry.

EXAMPLES.

Yds.	*qr.*	*na.*	*Ells*	*qr.*	*na.*	*E. F.*	*qr.*	*na.*
17	1	1	14	1	2	17	1	2
11	3	1	17	3	1	17	1	3
16	2	0	14	2	1	14	1	2
19	3	1	16	3	2	16	2	0
17	1	2	19	1	1	14	0	0
12	3	3	17	2	3	19	2	1
19	1	1	16	3	1	17	2	2
14	2	3	15	1	2	16	1	3

7. *Of* LAND MEASURE or SQUARE MEASURE.

Q. *Which are the Denominations of* Land Meaſure?

A.	16	Square Quarters of an Inch	make	1 Square Inch
	144	Square Inches		1 Foot
	9	Feet		1 Yard
	49	Square Yards		1 *Iriſh* Perch
	40	Perches or Poles		1 Rood
	4	Roods		1 Acre of Land
	640	Acres		1 Mile

The Surveyors full Chain is in Length 4 Perches, and is divided into 100 Links, the half Chain into 50, and the Perch into 25 Links and an Acre of Land contains 100000 ſquare Links: But as the *Engliſh* ſquare Perch contains but 10$\frac{88}{100}$ ſquare Paces, or 30¼ ſquare Yards, ſo their Acres, in Quantity, differ from ours in the ſame Proportion.

Note 1. *A Perch of* Iriſh *Maſon's Work is* 21 *Feet long and* 1 *Foot high, without regard to Thickneſs.*

2. *A Square of Carpenters, Tilers or Roofers Woork is* 100 *ſquare Feet; but Painters, Joyners, or Plaiſterers commonly work by the Yard ſquare, and Glaziers by the Foot ſquare.*

Q. *What is the Uſe of* Land Meaſure?

A. It gives the Content of any piece of Ground in Acres.

EXAMPLES.

A.	*r.*	*p.*	*A.*	*r.*	*p.*	*A.*	*r.*	*p.*
17	3	12	17	1	12	26	1	36
11	2	19	11	2	13	13	2	22
14	1	21	16	3	27	23	3	13
16	1	12	19	1	16	36	2	28
17	2	11	12	3	14	22	2	33
13	2	12	16	1	11	19	0	19
11	1	17	17	2	14	33	3	16
26	3	31	12	1	11	17	2	24

8. *Of* Liquid Meaſure.

Q. *How many ſorts of* Liquid Meaſure *are there in* England?

A. Two; *Wine Meaſure* and *Wincheſter Meaſure.*

Q. *What is the Difference between* Wine Meaſure, *and that for* Beer *and* Ale, *commonly called* Wincheſter Meaſure?

A. A Gallon of Wine is 231 ſolid Inches; but a Gallon of *Beer* or *Ale* exceeds that Meaſure by 51 Inches; and is 282 ſolid Inches.

But in *Ireland* there is but one kind of Liquid Meaſure, the Gallon contains $217\frac{5}{10}$ Cubic Inches: Retailers again divide the Gallon into 4 Quarts, the Quart into 2 Pints, the Pint into 4 Naggins, *&c.*

10 *Iriſh* Gallons make a Firkin or quarter Veſſel 2 Quarter Veſſels make a Kilderkin. 2 Kilderkins, or 40 Gallons a Barrel. 8 Barrels a Tun of Ale.

(1) *Of* Wine Meaſure.

Q. *Which are the Denominations of* Wine Meaſure?

A. 2 Pints make a Quart.
4 Quarts —— a Gallon.
10 Gallons—— an Anker of Brandy or Rum.
18 Gallons—— a Runlet.

31½ Gallons—— a Barrel.
42 Gallons—— a Tierce.
63 Gallons—— a Hogſhead.
84 Gallons—— a Puncheon.
2 Hogſheads—a Pipe or Butt.
2 Pipes or four Hogſheads a Tun.

Q. *What other Liquors are meaſured by the* Wine *Standard?*

A. All Brandies, Spirits, Strong Waters, Perry, Cyder, Mead, Vinegar, Honey and Oil.

Note, Milk *is alſo retailed by this* Standard, *not by* Law, *but* Cuſtom *only.*

EXAMPLES.

T.	*hds.*	*gls.*	*qts.*
7	1	12	2
6	3	31	3
7	1	41	2
6	2	17	1
7	3	14	3
1	2	19	1
9	1	15	2
3	1	11	2

Hds.	*gls.*	*qts.*
27	10	2
22	13	3
26	11	3
29	12	2
23	22	0
27	32	2
29	27	3
26	33	2

Tier.	*gls.*	*qts.*
27	12	1
29	17	3
22	11	2
27	31	3
29	12	1
27	11	2
26	17	1
22	11	3

(2) *Of* Wincheſter Meaſure.

Q. *Which are the Denominations of* Wincheſter Meaſure?

A. 2 Pints make a Quart.
4 Quarts ——— a Gallon.
8 Gallons ——— a Firkin of Ale.
9 Gallons ——— a Firkin of Beer.
2 Firkins ——— a Kilderkin.
4 Firkins ——— a Barrel.
1 Barrel and a half, or 54 Gallons, a Hhd. of Beer.

Q. *What is the Difference between* Ale *and* Beer Meaſure?

A. In *London* only they compute 8 Gallons to the *Firkin* of *Ale*, and 32 Gallons to the *Barrel*; but in all other Parts of *England*, for *Ale, Strong Beer,* and *Small Beer,* 34 Gallons are computed to the *Barrel*, and 8 Gallons and a half to the *Firkin*.

Q. *What other Commodities are there that go by the* Wincheſter Meaſure?

A. A Barrel of *Salmon* or *Eels* is 42 Gallons,
A Barrel of *Herrings* is 32 Gallons.
A Keg of *Sturgeon* is 4 or 5 Gallons.
A Firkin of *Soap* is 8 Gallons.

EXAMPLES.

Hds.	*gls.*	*qts.*	*B.B.*	*fir.*	*gal.*	*A.B.*	*fir.*	*gal.*
7	12	1	23	3	3	23	1	7
6	17	2	27	2	6	24	2	6
3	21	2	29	3	7	27	1	5
2	11	1	27	2	8	27	3	4
3	17	2	26	1	5	26	3	2
9	12	1	27	1	4	27	1	3
6	17	3	27	1	3	26	2	1
7	31	2	32	2	2	29	2	0

9. *Of* Dry Meaſure.

Q. *Which are the uſual Denominations of* Dry Meaſure?

A. 2 Pints make a Quart.
2 Quarts —— a Pottle.
2 Pottles —— a Gallon.
2 Gallons —— a Peck.
4 Pecks —— a Buſhel.
8 Buſhels —— a Quarter of Corn.
36 Buſhels —— a Chaldron of Coals.

Q. *Wherein does* London *differ from other Places in* England *in the* Coal Meaſure?

A. In *London* 36 Buſhels make a Chaldron; but in all other Places 32 Buſhels make a Chaldron. The Buſhels alſo in Water Meaſure contains 5 Pecks

Q. *What other Denominations are there in* Dry Meaſure?

A. A Score of Coals is 21 Chaldron.
A Sack of Coals is 3 Buſhels.
A Sack of Corn is 4 Buſhels.
10 Quarters of Corn make a Wey.
12 Weys are a Laſt.
A Load of Corn is 5 Buſhels.
A Cart Load Ditto is 40 Buſhels.

Q *What is the Uſe of* Dry Meaſure?

A *Dry Meaſure* is applied to all dry Goods, as *Corn*, *Seeds*, *Fruit*, *Roots* *Sand*, *Salt*, *Sea-coal*, *Charcoal*, *Small-coal*, *Oyſters*, *Muſcles* and *Cockles*.

Q. *What is the Standard for* Dry Meaſure?

A. The Standard for Dry Meaſure is a Wincheſter Buſhel, being 18 Inches and a half wide throughout, and 8 Inches deep. One Gallon of this Quantity is 268 ſolid Inches and ⅘, and conſequently is leſs than an Ale Gallon by 13 ſolid Inches.

Of COAL-MEASURE.

THO' moſt Commodities have been appointed to be ſold by Weight, and not by Meaſure, yet by 1 *Geo.* 2. *Cap.* 21. Sea-Coal Meaſure was regulated according to the following Table.

		Inches Diameter at the Bottom.	*Inches Diameter at the Top, at leaſt*		*Gallons*	
Half Barrel	*to meaſure*	24	25½	*and to contain*	20	*Wincheſter Meaſure*
Buſhel		20	21		10	
Half Buſhel		15	16		5	
Peck		11	12		2½	
Half Peck		10	11		1¼	

Note, *A Tun of Sea-Coal contains* 8 *Barrels, or* 16 *Half Barrels: But* Kilkenny *Coal (or other Stone Coal) is commonly ſold in the Pits by* Stands *or* Loads, at 5 Cwt. *to the* Load; *and ſuch Coal is alſo retailed by Weight.*

Charcoal *made of Wood is generally ſold by Meaſure, likewiſe Tanner's Bark, but ſome weigh them, eſpecially Bark.*

N. B. *In* Timber-Meaſure 1728 *cubic Inches make a Foot, and* 40 *Foot make a Tun of ſquared Timber.*

EXAMPLES.

Ch.	*bu.*	*p.*	*Qrs.*	*bu.*	*p.*	*Qrs.*	*bu.*	*p.*
17	11	3	14	7	2	36	7	3
16	10	2	16	1	1	43	6	2
19	11	1	19	3	2	22	3	3
17	12	3	16	1	1	37	2	2
16	19	3	17	3	2	26	5	2
17	11	1	16	1	1	28	4	3
17	11	3	12	3	1	33	7	0
11	14	1	37	2	3	42	3	2

10. *Of T I M E.*

Q. *Which are the Denominations of* Time?

A. 60 Seconds make a Minute
60 Minutes —— an Hour.
24 Hours —— a Day.
7 Days —— a Week.
4 Weeks —— a Month.
13 ſuch Months, 1 Day and 6 Hours nearly, a common Year.

Q. *What is a* Solar Year?

A. According to the beſt Computations, a Solar Year is 365 Days, 5 Hours, 48 Minutes, and 57 Seconds.

Q. *How is the* Year *divided by the* Calendar?

A. Thirty Days hath *September*,
April, *June*, and *November*;
All the reſt have thirty-one,
Except *February* alone,
Which claimeth Eight and a Score,
But every Leap Year one more.

E X A M P L E S.

M.	*w.*	*d.*	*H.*	*m.*	*ſec.*	*D.*	*h.*	*m.*	*ſec.*
17	3	4	42	17	10	14	11	10	12
14	1	6	17	10	32	17	11	13	16
17	2	5	17	22	21	19	12	16	11
16	1	3	14	21	32	17	12	17	13
19	3	2	4	2	3	14	13	26	31
16	1	1	7	3	1	13	12	11	48
26	2	0	63	26	30	17	16	19	12
13	2	2	22	28	42	13	16	26	51

11. *Of M O T I O N.*

Q. *Which are the Denominations of* Motion in the heavenly Bodies?

A. 60 Seconds make a prime Minute.
60 Minutes —— a Degree.
30 Degrees —— a Sign.
12 Signs, or 360 Degrees, make the whole great Circle of the Zodiac.

Examples.

EXAMPLES.

°	′	″	°	′	″
71	10	16	46	17	31
12	11	19	17	36	18
17	16	13	13	11	8
19	11	26	16	19	12
17	48	51	17	13	10
13	12	11	16	12	10
17	16	11	17	19	17
57	16	17	31	26	43

12. *Of Things bought and ſold by the Tale.*

Q. *Which are the Denominations of Goods accounted by the* Tale.

A. 12 Particulars ——— make a Dozen.
12 Dozen — — — a Groſs.
12 Groſs or 144 Dozen ——— a great Groſs.

The Table of *Numeration* is the Standard of Computation, or Reckoning; yet in the way of Dealing there are ſeveral Commodities ſold by *Count*, ſomewhat differently, which frequently puzzles young Scholars before they come to be acquainted with the Cuſtom, *&c.* As for Example.

Some things are ſold by the Dozen, which contains 12.

Some by the Groſs, which is 12 Dozen, or by the Great Groſs, which is 144 Dozen.

Some by the Score, which is 20.

Some by the Hundred, at 100, or 5 Score to the Hundred. And

Others are ſold by the Long-hundred, as 120 or 6 Score to the Hundred, as *Herrings, Nails, Eggs, Oyſters, Dry Cod, unſorted Quills.* with ſome others.

24 Sheets make a Quire of Writing Paper (but 25 Sheets a Printer's Quire) and 20 Quires a Rheam.

There are many other Things ſold in like manner, as above needleſs to be mentioned here.

Examples are needleſs.

Queſtions to Exerciſe Addition.

1. A Man was born in the Year 1722, I demand when he will be 67 Years of Age?

2. There are two Numbers whoſe Difference is 17. and he leſſer Number is 44; What is the greater Number?

3. A Man borrowed a Sum of Money, and paid in Part 1*l.* 10*s.* and the Remainder is 17*l.* 10*s.* I demand the Sum borrowed?

4. *A* owes me 3 Guineas, *B* 50 *l.* 12*s.* *C.* 104 *l.* D three-ſcore and ſeventeen Pounds, How much is due to me in all?

As there is frequently time loſt in Writing Multiplication-Tables for the Pupils in ſome Schools, — I here ſubjoin one, which may be cut out and paſted on ſtiff Paper to make it more durable. The Maſter may uſe his diſcretion in directing whether the pupil, ſhall at firſt get by heart the Whole Table or to nine times only.

The TABLE.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	5	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

5. A Man hath 6 Bags of Hops: the firſt weighs *2qrs.* 14℔ and each of the reſt weighs 14℔ more: What Quantity hath he in the Whole?

6. A Man took a Houſe for 12 Years; and by Agreement was to pay 100 *l.* 10 *s.* down; 190 *l.* 4*s.* at the End of ſix Years; and 109*l.* 6*s.* at the End of 12 Years: I demand how much the whole Sum was?

Of SUBTRACTION.

Q. WHAT *is the Uſe of* Subtraction?

A. By taking a *leſs* Number from a *greater*, it ſhews the *Difference* between both.

Q. *How many Sorts of* Subtraction *are there?*

A. Two; *Simple* and *Compound.*

Of Simple SUBTRACTION.

Q. *What is* Simple Subtraction?

A. *Single* or *Simple Subtraction* is the finding a Difference between any two Numbers, whoſe Signification is the ſame; as the Difference between 26 Yards and 14 Yards, is 12 Yards.

Q. *How are Numbers to be placed in* Subtraction?

A. With *Units* under *Units*, *Tens* under *Tens*, &c. as in *Addition.*

Q. *What Rule have you for the Operation of* Subtraction *in* general?

A. When the lower *Number* is greater than the upper, take the lower *Number* from the *Number* which you borrow, and to the Difference add the upper *Number*, carrying one to the next loweſt Place.

Q. *What* Number *muſt you borrow, when the lower* Number *is greater?*

A. The ſame which you ſtop at in *Addition.*

Q. *How do you prove* Subtraction?

A. By adding the Remainder and the leſſer Line together, which will always be equal to the greater Line: Or,

By ſubtracting the Remainder from the greater Line, and that Difference will always be equal to the leſſer Line.

EXAMPLES.

	£.	*Yards*	*Miles*	*Days*	*Months*
From	763	7694	41372	761214	7613471
Take	122	1867	13676	131812	1813126
Diff.					

	Hours	℔	*Crowns*	*Shillings*
From	31261812	312617127	71254671	7612641
Take	19879128	173121712	26571914	5910817
Diff.				

Of Compound SUBTRACTION.

Q. *What is* Compound Subtraction?

A. *Compound Subtraction* produces a Difference between any two Sums of divers Denominations.

1. *Of* MONEY.

EXAMPLES.

	£.	*s.*	*d.*	*£.*	*s.*	*d.*	*£.*	*s.*	*d.*	*£.*	*s.*	*d.*
From	14	10	6½	36	12	6½	76	12	4¾	31	18	4½
Take	3	17	8½	17	11	9¾	17	13	3¼	16	19	1¼
Diff.												

	£.	*s.*	*d.*	*£.*	*s.*	*d.*	*£.*	*s.*	*d.*	*£.*	*s.*	*d.*
From	41	15	3	76	3	4½	76	7	6	17	12	1¼
Take	14	17	1½	13	17	7	19	4	1½	14	17	2
Diff.												

	£.	*s.*	*d.*	*£.*	*s.*	*d.*	*£.*	*s.*	*d*	*£.*	*s.*	*d.*
From	136	17	6½	47	17	6	413	11	7¾	71	18	9
Take	76	12	7¾	19	11	6¼	171	11	9½	17	16	10¾
Diff.												

Borrowed

	£.	s.	d.
Borrowed	764	0	0
Paid at ſeveral times.	13	1	2½
	17	4	1
	16	1	6¾
	21	2	8
	19	11	10
	26	13	5¼
	11	19	6½
	12	12	2½
Paid in all			
Unpaid			

	£.	s.	d.
Lent	800	10	6
Receiv'd at ſeveral times	12	11	2½
	19	12	6
	17	11	2½
	14	11	3
	19	12	2
	14	11	8½
	17	16	2½
	46	12	7¼
Received in all			
Remains due			

2. *TROY WEIGHT.*

	Oz.	*dw.*	*gr.*	*Oz.*	*dw*	*gr.*	*Oz.*	*dw.*	*gr.*	℔	*oz.*	*dw.*	*gr.*
From	71	11	12	71	12	18	13	16	12	84	4	11	12
Take	2	10	19	10	4	19	5	19	14	17	10	11	7
Diff.													

3. *AVOIRDUPOIS WEIGHT.*

	C.	*qrs.*	℔	℔	*oz.*	*dr.*	℔	*oz.*	*dr.*	*T.*	*c.*	*qrs.*	℔
From	72	1	18	17	2	1	17	10	1	12	1	2	10
Take	3	1	26	10	13	2	15	14	3	5	3	1	19
Diff.													

4. *APOTHECARIES WEIGHT.*

	℥	ʒ	℈	*gr.*	℥	ʒ	℈	*gr.*	℔	℥	ʒ	℈	*gr.*
From	65	4	2	10	47	5	1	16	48	3	2	0	19
Take	7	7	2	12	2	1	2	18	10	1	2	3	17
Diff.													

5. *LONG MEASURE.*

	Le.	*m.*	*f.*	*p.*	*Yd.*	*f.*	*in.*	*bc.*	*Le.*	*m.*	*f.*	*p.*
From	71	1	3	10	48	0	1	2	61	0	1	3
Take	14	2	5	16	12	0	3	1	17	1	2	20
Diff.												

6. *CLOTH MEASURE.*

	Yd.	*qr.*	*na.*	*EF.*	*qr*	*na.*
From	71	3	1	51	2	2
Take	19	2	3	16	1	1
Diff.						

	Yd.	*qu.*	*na.*	*E.*	*qu.*	*na.*
From	47	2	1	17	1	2
Take	12	1	2	14	4	3
Diff.						

	Yds.	*qrs.*	*na.*
A Draper bought	148	0	0
Sold at ſeveral times.	14	1	2
	17	3	3
	19	1	2
	16	1	1
	17	3	3
Sold in all			
Unſold			

7. *LAND MEASURE.*

	A.	*r.*	*p.*	*A.*	*r.*	*p.*	*A.*	*r.*	*p.*	*A.*	*r.*	*p.*
From	12	1	10	17	3	17	28	1	9	32	0	9
Take	5	3	17	12	3	23	19	1	28	16	2	23
Diff.												

8. *WINE MEASURE.*

	T.	*hd.*	*gal.*	*T.*	*hds.*	*gal.*	*Gals.*	*qts.*	*pot.*	*Gals.*	*qts.*	*pot.*
From	3	2	10	7	2	10	19	2	1	67	1	1
Take	1	3	19	1	2	28	12	1	1	12	3	0
Diff.												

9. *WINCHESTER MEASURE.*

	Hhds.	*gal.*	*qts.*	*A.B.*	*f.*	*gal.*	*B.B.*	*f.*	*gal.*	*Hds.*	*gal.*	*qts*
From	17	10	1	17	2	1	48	1	3	41	2	2
Take	12	11	2	14	1	3	17	1	7	23	3	3
Diff.												

10. *DRY MEASURE.*

	Ch.	*bu.*	*p.*	*Ch.*	*bu.*	*p.*	*Qrs.*	*bu.*	*p.*	*Qrs.*	*bu.*	*p.*
From	17	2	1	40	1	2	19	1	1	26	1	3
Take	10	1	3	16	5	1	12	7	2	19	1	2
Diff.												

11. *TIME.*

	D.	*h.*	*m.*	*ſec.*	*W.*	*D.*	*h.*	*m.*	*ſec.*	*W.*	*d.*	*h.*	*m.*	*ſec.*
From	41	1	22	12	14	1	20	12	10	17	1	10	12	10
Take	22	16	33	31	10	3	19	48	26	10	2	14	6	15
Diff.														

12. *MOTION.*

	°	′	″	°	′	″	°	′	″
From	48	10	12	47	2	10	62	13	00
Take	19	11	16	12	19	48	49	18	33
Diff.									

Queſtions to exerciſe Subtraction.

1. A Man was born in the Year 1708; I demand his Age in the Year 1762?

2. There are two Numbers, the greater Number is 61, and the leſſer is 44; I demand the Difference?

3. There are two Numbers, whoſe Difference is 17, and the greater Number is 61; I demand the leſſer Number?

4. A Man borrowed 30*l.* and paid in Part 12*l.* 10*s.* I demand how much remains unpaid?

5. King *Charles* the Martyr was beheaded in the Year 1648; how many Years ſince that time?

6. *A* is indebted to the Brewer the Sum of 109*l.* 10*s.* *B* owes him 94*l.* 4*s.* 10½*d.*; how much does one owe more than the other?

7. What Sum is that, which taken from 100 *l.* leaves 48*l.* 7*s.* 6½*d.*?

8. There were 4 Bags of Money containing, as follows, *viz.* The firſt Bag 34*l.* the ſecond Bag 50*l.* the third Bag 100*l.* and the fourth Bag 150*l.* which were to be paid to ſeveral Perſons; but one of the Bags being loſt, there were but 234*l.* paid; I demand which Bag was wanting?

Of MULTIPLICATION.

Q. WHAT *is* Multiplication?

A. It is a ſhort Way of performing ſeveral *Additions.*

Q. *How many Parts are there in* Multiplication?

A. Three, *viz.*

1. The *Multiplicand,* or Sum to be multiplied.
2. The *Multiplier.* or Sum multiplied by.
3. The *Product* or total of the *Multiplicand,* as often as there are Units in the *Multiplier.*

Note, *The* Multiplicand *and the* Multiplier, *are alſo called* Factors; *and the* Product, *the* Fact *or* Rectangle.

Q. *How many Sorts of* Multiplication *are there?*

A. Two, viz. *Simple* and *Compound.*

Of Simple Multiplication.

Q. *What is* Simple Multiplication?

A *Simple Multiplication* is the multiplying of any two Numbers together, without reſpect to their Signification; as 7 times 8, is 56.

Note 1. *As* Addition *and* Subtraction *of* Integers *are called* Simple Addition *and* Simple Subtraction; *ſo ſhould* Multiplication *and* Diviſion *of* Integers *be called* Simple Multiplication *and* Simple Diviſion; *and that only ſhould be called* Compound Multiplication, *and* Compound Diviſion, *which hath Numbers of divers Denominations to be either* multiplied, *or* divided.

2 *The following* Table *muſt be learned perfectly by Heart before you can proceed any further.*

The

The *MULTIPLICATION TABLE.*

3 times 3 is 9	5 times 6 is 30	11 times 3 is 33
4 12	7 35	4 44
5 15	8 40	5 55
6 18	9 45	6 66
7 21	6 times 6 36	7 77
8 24	7 42	8 88
9 27	8 48	9 99
4 times 4 16	9 54	12 times 3 36
5 20	7 times 7 49	4 48
6 24	8 56	5 60
7 28	9 63	6 72
8 32	8 times 8 64	7 84
9 36	9 72	8 96
5 times 5 25	9 times 9 81	9 108

CASE I.

Q. *What do you obſerve in the* firſt Caſe *of* Multiplication?

A That the Factors be placed one nnder another, in ſuch manner, that Units may ſtand nnder Units, Tens under Tens, *&c.* and then multiply as the Table directs.

EXAMPLES.

£.	*Crowns*	*Days*	*Hours*
57093575	35798256	25746503	32190579
1	3	4	5

Minutes	*Years*	*Gallons*	*Ounces*
75350987	37096578	14653708	53263729
6	7	8	9

Shillings	*Yards*	*Buſhels*	*Ells*
45709837	76535365	89045757	53057597
11	12	11	12

Q. *How do you multiply by any Number between* 12 *and* 20, *at one Operation ?*

A Multiply by the Figure in Units Place, and as you multiply, add to the Product of each ſingle Figure that of the Multiplicand, which ſtands next on the right Hand.

Gallons	*Days*	*Months*	℔
5740957	6743589	4083575	7320576
15	16	17	18

C A S E 2.

Q. *What do you obſerve in the* ſecond Caſe *of* Multiplication?

A. 1. When the *Multiplier* conſiſts of more Figures than one, there muſt be made as many ſeveral *Products*, as there are Figures contained in the *Multiplier*.

2. Let the firſt Figure of every *Product* be placed exactly under its *Multiplier*.

3. Add theſe *Products* together, and their Sum will be the total *Product*.

Q. *How do you prove* Multiplication ?

A. *Multiplication* and *Diviſion* do mutually prove each other; yet *Multiplication* may as truly be proved by itſelf, by inverting the Factors.

E X A M P L E S.

Crowns	*Days*	*Weeks*	*Pence*
691861	129186	281216	181281
26	98	978	763
17988386	12660228	275029248	138317403

Ounces	*Yards*	*Pints*	*Quarts*
269181	261986	812617	281691
4619	7618	13819	71286
1243347039	1995809348	11229554323	20080624626

Q. *What Exception have you to this* Caſe?

A When theſe Figures 1 and 1, or 1 and 2, or any other two Figures under 20, happen together in the Multiplier, you may multiply by both at once; as in Caſe 1.

EXAMPLES.

Weeks	*Buſh ls*	*Grains*	*Leagues*
761312	671612	963458	843126
412	114	912	119
313660544	76563768	878673996	100331994

CASE 3.

Q. *What do you obſerve in the* third Caſe *of* Multiplication?

A. 1. Such *Factors*, as have *Cyphers* at the Ends, muſt be ſet one under another; as if there were no *Cyphers.*

2. The *Cyphers* placed at the End of either, or both of the *Factors*, are to be omitted till the laſt Product, and then the ſame Number of *Cyphers* muſt be annexed to it.

EXAMPLES.

Pence	*Hours*	*Yards*
476000	180120	461210
170	48100	42100
80920000	8663772000	19416941000

Nails	*Inches*	*Barrels*
760000	461200	61810
4800	48300	74210
3648000000	22137600000	4586252210 0

CASE 4.

Q. *What do you obſerve in the* fourth Caſe *of* Multiplication?

A. When C*yphers* are placed between the ſignificant *Figures* in the *Multiplier*, they muſt be omitted in the Operation; regard being had to the firſt Figure of every particular *Product*, as before.

EXAMPLES.

Gallons	*Eggs*	*Buttons*
128121	128128	246145
72001	70043	60012
9224840121	8974169504	14771653740

CASE

CASE 5.

Q. *How do you multiply by the* Parts *of any Number, inſtead of the* Whole?

A. When the *Multiplier* is ſuch a Number, that any two Figures being multiplied together, will make the ſaid *Multiplier*, it is ſhorter to multiply the given Number by one of thoſe Figures, and that Product by the other; as 5 times 7 is 35.

EXAMPLES.

Pounds	*Men*	*Soldiers*	*Sailors*
764126	764131	461231	461312
35	48	72	36
26744410	36678288	33208632	16607232

Of Compound Multiplication.

Q. *What is* Compound Multiplication?

A. When ſeveral Numbers of divers Denominations are given to be multiplied by one common *Multiplier*; this is called *Compound Multiplication.*

EXAMPLES.

£.	*s.*	*d.*	℔	*oz.*	*dwt.*	*gr.*	*C.*	*qrs.*	℔	℔	*oz.*	*dr.*
17	3	1¼	17	3	12	16	43	1	14	17	12	10
		2				3			4			5

M.	*f.*	*p.*	*Yd.*	*f.*	*in.*	*bc.*	*Yds.*	*qrs.*	*n.l.*	*BB.*	*fir.*	*gal.*
16	4	21	17	2	3	1	16	3	2	17	2	3
		6				7			8			9

Ch.	*b.*	*q.*	*Da.*	*h.*	*m.*	*ſec.*	*M.*	*w.*	*da.*	°	′	″
16	12	3	17	14	14	15	16	3	4	16	11	13
		10				12			11			7

Queſtion

Queſtions to exerciſe Multiplication.

1. If one Man's Pay be 3*s.* what muſt 40 Men have?

2, What is the Product of 76, multiplied by 3 and by 7?

3. There are 124 Men employed to finiſh a Piece of Work, and they are to have 3*l.* each Man; I demand how much they muſt all have?

4. An Army of 10000 Men having plundered a City, took ſo much Money, that, when it was ſhared among them, each Man had 27*l.* I demand how much Money was taken in all?

5. There were 40 Men concerned in the Payment of a Sum of Money, and each Man paid 1271*l.* how much was paid in all?

6. If one Foot contains 12 Inches, I demand how many Inches there are in 126 Feet?

7. What is the Product of 769, multiplied by 9 and 7?

† See Appendix for further Obſervations.

Of DIVISION.

W*HAT is* Diviſion?

A. It is a ſhort Way of performing ſeveral *Subtractions,* and ſhows how oft one Number is contained in another, and what remains.

Q. *How many Parts are there in* Diviſion?

A. Four, *viz.*

1. The *Dividend,* or Sum to be divided?
2. The *Diviſor,* or Sum divided by.
3. The *Quotient,* or Anſwer to the Queſtion.
4. The *Remainder,* which is always leſs than the *Diviſor,* and of the ſame Name with the *Dividend.*

Note, *The* Diviſor, Dividend *and* Quotient *are certain; but the* Remainder *is uncertain, becauſe ſome Operations in* Diviſion *have no* Remainder.

Q. *How many Sorts of* Diviſion *are there?*

A. Two, *Simple* and *Compound.*

Of Simple Diviſion.

Q. *What is* Simple Diviſion?

A. *Simple Diviſion* is, when the *Diviſor* and *Dividend* are made choice of, without any Regard to their Signification; as, 56 divided by 7, gives 8 for the Quotient; or, the Number 7 is contained in 56, eight times.

Q. *How many Sorts of* Simple Diviſion *are there?*

A. Two; *Short Diviſion* and *Long Diviſion.*

Of

Of Short DIVISION.

Q. *What is* Short Diviſion?

A. *Short Diviſion* is, when the Diviſor does not exceed 12.

EXAMPLES.

Min.	Months	Days
2)75430957(	6)540807543(	11)7559476357(
3)60325647(	7)753546809(	12)7453098705(
4)40983476(	8)675439057(	11)6540578506(
5)95743875(	9)350657398(	12)5643098453(

Q. *How is* Diviſion *proved?*

A. Multiply the *Diviſor* and *Quotient* together and the *Remainder* (if there be any) add to the Product; that Sum will be equal to the *Dividend.* Or,

Divide the *Dividend* by the *Quotient*; and the *Quotient* of the new *Diviſion,* will be equal to the *Diviſor* of the former Diviſion; and the *Remainder* (if there be any) will be the ſame.

Of Long DIVISION.

CASE I.

Q. *What is* Long Diviſion?

A. When the *Diviſor* is more than 12, for help of the Memory, we are obliged to multiply the *Quotient* Figure and *Diviſor* together, and ſubtract that Product from the *Dividend,* in order to find out the *Remainder*; which Operation muſt be continued to every *Quotient* Figure: And this is called *Long Diviſion.*

EXAMPLES.

Yards	*Shillings*	*Pence*
91)7540943(	28)7460935(	1217)6498047(
82)4057609(	19)4098456(	3164)7986453(
73)6535098(	381)2578546(	6128)4573857(
64)5630967(	773)9864743(	9212)4375455(
55)3545657(	937)9835457(	33108)8575465(
46)7435409(	761)3545609(	71216)5037908(
37)3503298(	7618)1534985(	89257)3450859(

CASE

CASE 2.

Q. *What do you obſerve of* Cyphers *placed at the End of the* Diviſor?

A. 1. They muſt be cut off; and the ſame places alſo muſt be cut off in the *Dividend.*

2. Thoſe Figures, which are cut off in the *Dividend,* muſt be annexed to the *Remainder* at laſt.

EXAMPLES.

Yards | *Crowns*

625|00)712613|12(| 128|000)73126|071(

426|00)713121|74(| 412|000)71613|181(

CASE 3.

Q. *How do you divide by the* Parts *of any Number inſtead of the* Whole?

A. When the *Diviſor* is ſuch a Number that any two Figures being multiplied together will make the ſaid *Diviſor,* it is ſhorter to divide the given Number by one of thoſe Figures, and that *Quotient* by the other; as 5 times 7 is 35.

EXAMPLES.

Pence	*Crowns*	*Pounds*
35)26744410(	48) 6678288(	72)33208632(

Of Compound Diviſion.

Q. *What is* Compound Diviſion?

A. When ſeveral Numbers of divers Denominations are given to be divided by one common *Diviſor*; this is called *Compound Diviſion.*

EXAMPLES.

l. *s.* *d.*	℔ *oz.* *dwt* *gr.*	*T.* *c.* *qr.* ℔.
2)48 12 6½(	3)14 10 3 16(	4)17 1 1 14(
℔ *oz.* *dr.*	*M.* *f.* *p.*	*Yds.* *f.* *in.* *bc.*
5)46 12 10(	6)18 2 14(	7)46 0 10 2(
Yds. *qrs.* *na.*	*A.B.* *fir.* *gal.*	*Ch.* *bu.* *p.*
8)15 2 2(	9)17 3 2(	10)20 13 2(
M. *w.* *d.*	*D.* *h.* *m.* *ſec.*	° ' ''
11)48 2 2(	12)46 16 12 30(	12)33 4 11

Queſtions to exerciſe Diviſion.

1. If 140s. be divided amongſt 40 Men, how much a-piece?

2. If 1596 be divided by 21, what is the Quotient?

3. There are 124 Men, which have 372*l.* how much muſt each Man have?

4. An Army of 19000 Men, having plundered a City, took 266000*l.* how much muſt each Man have?

5. There were a certain Number of Men concerned in the Payment of 1272*l.* and each Man paid 3*l.* I demand the Number of Men?

6. What is the Quotient of 48447. divided by 9 and by 7?

7. If 3264, be divided by 12 and by 4, what is the Quotient?

8. A certain Man, intending to go a Journey of about 3270 Miles, would compleat the ſame in 136 Days; I demand how many Miles he muſt travel each Day?

Of REDUCTION.

Q. WHAT *is* Reduction?

A. Reduction is the bringing or reducing Numbers of one Denomination into other Numbers of another Denomination, but of the ſame Value.

Q. *How are Denominations of any kind reduced from one to another?*

A. By *Multiplication* and *Diviſion.*

Q. *When is* Multiplication *to be uſed?*

A. When great Names are to be brought into ſmall; as *Pounds* into *Shillings,* or *Days* into *Hours*; and this is called *Reduction deſcending.*

Q. *When is* Diviſion *to be uſed?*

A. When ſmall Names are to be brought into great; as *Shillings* into *Pounds,* or *Hours* into *Days*; and this is called *Reduction aſcending.*

Note, *Whether you* multiply *or* divide, *it muſt be by as many of the* leſs, *as make one of the* greater *Denomination.*

Q. *How are Queſtions in* Reduction *proved?*

A. By varying the Order of them.

† See Appendix for the Value of Coin in *Ireland.*

Of M O N E Y.

Reduction *Deſcending.*

1. In 46*l.* how many Shillings and Pence? *Anſw.* 920*s.* 11040*d.*

46*l.*
20
920 *s.*
12
11040 *d.*

2. In 7*l.* how many Shillings and Pence? *Anſw.* 140 *s.* 1680*d.*

3. In 9*l.* how many Shillings Pence and Farthings? *Anſw.* 180*s.* 2160*d.* 8640 *qrs.*

4. In 7*l.* 14*s.* 6¼*d.* how many Farthings? *Anſw.* 7417 *qrs.*

5. In 12 Crowns, how many Shillings and Pence? *Anſw.* 60*s.* 720*d*—Iriſh 65*s.* 780 Pence.

6. In 15*l.* how many Crowns and Shillings? *Anſw.* 60 *Cr.* 300*s,*—Iriſh 55 Crowns and 25 Pence, 300 Shillings.

7. In 50 Half-crowns, how many Pence and Farthings? *Anſw.* 1500*d.* 6000*qrs.*—Iriſh 1625 Pence, 6500 Farthings.

8. In 306 Crowns, how many Half crowns and Pence? *Anſw.* 612 *half-cr.* 18360*d.*—Iriſh 612 half-cr. 19890 Pen.

9. Reduce 120 Six-pences, into Three-pences, Pence and Farthings? *Facit,* 240 *Three-pences* 720 *d* 2880 *qrs.*

10. Reduce 210 Crowns, into Shillings, Groats and Pence? *Facit,* 1050*s.* 3150 *Groats,* 12600 *d.*—Iriſh 1137*s.* and 6*d.* or 3412½ Groats, 13650 Pence.

11. Reduce 86*l.* into Crowns, Shillings and Groats? *Facit,* 344 *Cr.* 1720*s.* 5160 *Groats*—Iriſh 317 *Cr.* and 35*d.* 1720*s.* 5160 *Groats.*

12. How many Shillings and Pence are in 17 Guineas? *Anſ.* 357*s.* 4284*d.*—Iriſh 368*s.* and 9*d.*—4641*d.*

13. How many Crowns and Sixpences are in 28 Pounds? *Anſw.* 112 *Cr.* 1120 *Six-pences.*—Iriſh 103 *Cr.* and 25 *d.* 1120 Six-pences

Reduction *Aſcending.*

1. In 11040*d.* how many Shillings and Pounds? *Anſwer,* 920*s.* 46*l.*

20
12)11040(920(46*l.*

2. In 1680*d.* how many Shillings and Pounds? *Anſwer,* 140*s.* 7*l.*

3. In 8640 qrs. how many Pence Shillings and Pounds? *Anſw.* 2160*d.* 180*s.* 9*l.*

4. In 7417 qrs. how many Pounds? *Anſ.* 7*l.* 14*s.* 6¼*d.*

5. In 720 *d.* how many Shillings and Crowns? *Anſw.* 60*s.* 12 *Cr.*—Iriſh 11 *Cr.* and 5*d.*—60*s.*

6. In 300*s.* how many Crowns and Pounds? *Anſ.* 60 *Cr.* 15*l.*—Iriſh 95 *Cr.* and 25*d.*—15*l.*

7. In 6000 qrs. how many Pence and Half-crowns? *Anſ.* 1500*d.* 50 *Half-cr.*—Iriſh 1500*d.* 46 *Half-cr.* and 5*d.*

8. In 18360*d.* how many Half-crowns and Crowns? *Anſ.* 612 *Half-cr.* 306 *Cr.*—Iriſh 564 *Half-cr.* and 3*d.* 282 Cr. and 1½*d.*

9. Reduce 2880 qrs. into Pence, Three-pences and Six-pences? *Facit,* 720*d* 240 *Three-pences,* 120 *Six-pences.*

10. Reduce 12600*d.* into Groats, Shillings and Crowns. *Facit,* 3150 *Gr.* 1050*s* 210 *Cr.* Iriſh 3150 *Groats,* 1050*s.* 193 *Cr.* and 55*d.*

11. Reduce 5160 Groats into Shil. Crowns and Pounds. *Facit,* 1720*s.* 344 *Cr.* 86*l.* Iriſh 1720*s.* 317 *Cr.* and 25*d.*

12. How many Shillings and Guineas are in 4284 Pence? *Anſ.* 357*s.* 17 *Guineas,* Iriſh 15 *Guin* and 189 *d.*

13. How many Crowns and Pounds are in 1120 Six-pences? *Anſw.* 112 *Cr.* 28*l.* Iriſh 103 *Cr.* and 25*d.*

Reduction *Aſcending and Deſcending.*

1. In 720 Shilings, how many Pence and Crowns? *Anſ.* 8640*d.* 144 *Cr.* Iriſh 8640*d.* 132 *Cr.* and 60*d.*

720*s.*
12
60)8640(144

2. In 120 Shillings, how many Crowns and Half crowns? *Anſw.* 14 *Cr.* 48 *Half-cr.* Iriſh 21 *Cr.* & 10*d.* 14 *H. c.* &20*d.*

3 In 60 Crowns, how many Shillings and Pounds? *Anſ.* 300*s.* 15*l.* Iriſh 225*s.* 16*l.* 5*s.*

4. In 612 Half-crowns, how many Crowns and Pence? *Anſw.* 306 *Cr.* 18360*d.* Iriſh 306*Cr.* 19890*d.*

5. In 40Guineas, how many Shillings, Crowns and Pounds? *Anſ.* 840*s.* 168 *Cr.* 42*l.* Iriſh 910*s.* 168 *Cr.* 45*l.* 10*s.*

6. Reduce 12600Pence, into Shillings. Groats and Crowns. *Facit,* 1050*s.* 3150*Gr.* 210*Cr.* Iriſh 1050*s.* 3150*Gr.* 193*Cr.*

7. Reduce 63 Crowns, into Shillings and Guineas. *Facit,* 315*s.* 15 *Guineas.* Iriſh 341*s.* and 3*d.* 15 *Guineas.*

8. Reduce 70 Moidores into Pounds. *Facit,* 94*l.* 10*s.* Iriſh 102*l.* 7*s.* 6*d.*

9. Reduce 12180 Three-pences into Shillings, Pence and Groats. *Facit*, 3045*s.* 36540*d.* 9135 *Gr.*

10. How many Crowns, Groats and Pounds are in 1720 *s.* *Anſ.* 344 *Cr.* 5160 *Gr.* 86*l.* Iriſh 317 *Cr.* and 35 *d.* 5016 *Gr.*

11. How many Groats, Three-pences and Six-pences are in 121 Shillings? *Anſ.* 363 *Gr.* 484 *Three-pences*, 242 *Six-pences.*

12. How many Pounds and Crowns are in 1120 Six-pences? *Anſw.* 28*l.* 112 *Cr.* Iriſh 28*l.* 103 *Cr.* and 25*d*,

13. How many Crowns, Half-crowns and Shillings are in 280*l.* and the Number of each equal? *Anſ.* 658, and 7*s.* over. Iriſh 613 and 6*s.* 4½*d.* over.

14. Four Men brought each 17*l.* 10*s.* *Eng.* Value in Gold into the Mint, to be coined into Guineas, how many muſt they have? *Anſw.* 66 *Guineas*, 14*s.*

15. There are 12 Purſes, with each 12 Guineas, how much *Sterling* is the Sum? *Anſw.* 151*l.* 4*s.* Iriſh 163*l.* 16*s.*

16. A certain Ground tenant was behind with his Landlord for 16 Years Rent, at 5*l.* 10*s.* a Year, how much was the Debt? *Anſw.* 88*l.*

17. There are 34*l.* 17*s.* to be divided among 17 Men, how much is it a-piece? *Anſw.* 2*l.* 1*s.*

18. In 19 Moydores how many Pounds *Sterling*? *Anſw.* 25*l.* 13*s.* Iriſh 27*l.* 15*s.* 9*d.*

Of TROY WEIGHT.

1. In 47℔ 10 *oz.* how many Grains? *Anſw.* 275520 *gr.*

2. In 47128 Grains of Gold, how many ℔? *Anſw.* 8℔. 2 *oz.* 3 *dwt.* 16 *gr.*

3. In 10℔ of Silver, how many Spoons, each 5 *oz.* 10 *dwts.* *Anſw.* 21 *Spoons*, and 90 *dwts.* over.

4. In 4560 Grains of Gold, how many Tea ſpoons, each half an Ounce? *Anſw.* 19 *Tea-ſpoons.*

5. In 47 Salvers, each 20 *oz.* how many ℔? *Anſw.* 78℔ 4 *oz.*

6. How many Porringers, each 11 *oz.* are in 19℔ 10 *oz.* 11 *dwts.* of Silver? *Anſ.* 21 *Porringers* and 15 *dwts.* over.

7. A Goldſmith having 3 Ingots of Silver, each weighing 27 *oz.* was minded to make them into Spoons of 2 *oz.* Cups of 5 *oz.* Salts of 1 *oz.* and Snuff-boxes of 2 *oz.* and to have an equal Number of each; the Queſtion is, what was that Number? *Anſw.* 8, and 1 *oz.* over.

8. In 17 Ingots of Silver, each 27 *oz.* 10 *dwts.* how many Grains? *Anſw.* 224400 *gr.*

3. *AVOIRDUPOIS WEIGHT.*

Q. *Which are the* Allowances *uſually made, in* Avoirdupois *great Weight to the Buyer?*

A. They are *Tare*, *Trett* and *Cloff*.

Q. *What is* Tare?

A. *Tare* is an Allowance made to the *Buyer*, for the Weight of the *Box Bag*, *Veſſel*, or what ever elſe contains the Goods bought; and is either,

1. At ſo much *per Bag*, *Barrel*, *Box*, &c.
2. At ſo much *per Cent.* Or,
3. At ſo much in the *Groſs* Weight, called *Invoice Tare.*

Q. *What is* Trett?

A. *Trett* is an Allowance, made by the Merchant to the *Buyer*, of 4℔ in 100℔ for Waſte and Duſt, in ſome ſort of Goods.

Note, *If an allowance be made both for* Tare *and* Trett, *in the ſame parcel of Goods; the* Tare *is firſt to be deducted and that Remainder is called* Suttle Weight.

Q. *What is* Cloff?

A. *Cloff* is an Allowance of 2℔ Weight to the Citizens of *London*, on every Draught above 3 C. Weight, on ſome ſort of Goods; as, *Galls*, *Madder*, *Sumac*, *Argol*, &c.

Q. *What are theſe Allowances called beyond the Seas?*

A. They are called the *Courteſies of London*, becauſe they are not practiced in any other Place.

Q. *What is* Groſs Weight?

A. *Groſs* is the Weight of any ſort of Merchandize, and that which contains it, being weighed both together.

Q. *What is* Neat Weight?

A. *Neat* is the pure Weight of the Goods, after all Allowances are deducted.

Note 1. Raw, Long, Short, China, Morea Silk, *&c.* are *weighed by a great Pound of* 24 oz. *But* Ferret, Filoſella, Sleeve-ſilk, *&c. by the common Pound of* 16 oz.

2. *To bring great Pounds into common, multiply by* 3, *and divide by* 2.

3. *To bring common Pounds into great, multiply by* 2, *and divide by* 3.

CASE I.

1. In 7 *C.* 3 *qrs* 10℔, how many Ounces and Drams? *Anſw.* 14048 *oz* 224768 *dr.*

2. In 3 Tons of Iron how many *C. qrs.* and ℔? *Anſw.* 60*C.* 240 *qrs.* 6720 ℔

3. In 14048 *oz.* how many *C?* *Anſw.* 7*C.* 3*qrs.* 10℔.

4. In 6720 ℔ of Iron how many Tons? *Anſw.* 3 *Tons.*

5. In 461 great Pounds of *Morea-Silk*, how many Ounces and Drams? *Anſw.* 11064 *oz.* 177024 *dr.*

6. In 40426 Drams of Silk, how many great Pounds? *Anſw.* 105 *great Pounds* 6 *oz.* 10 *dr.*

7. In 3 lb of Cinnamon, how many Parcels, each 12*oz.*? *Anſ.* 4 *Parcels.*

8. In 470 Parcels of Sugar, each 26 lb, how many *C.?* *Anſw.* 109 *C.* 0*qrs.* 12lb.

9. In 672 great Pounds of Silk, how many common Pounds? *Anſw.* 1008 *common* ℔.

10. In 480 common Pounds of Silk, how many great Pounds? *Anſw.* 320 *great* ℔.

11. In 8 Hhds. of Tobacco, each weighing Neat 7 *C.* ½, how many Pounds? *Anſw.* 6720 ℔.

12. In 17 Pigs of Lead, each weighing 4*C.* ¾, how many Fother, at 19*C.* ½? *Anſw.* 4 *Fother* 2 *C.* 3 *qrs.*

13. In 712 *C.* of Lead, how many Fother? *Anſw.* 36 *Fother* 10 *C.*

14. In 17 *C.* 1*qr.* 6℔ of Sugar, how many Parcels, each 17℔? *Anſw.* 114 *Parcels.*

CASE II.

Of Tare *and* Trett, *&c*

Q. *When the* Tare *is at ſo much* per Barrel, Bag, *&c. how is the* Neat Weight *found?*

A. Multiply the Number of the ſaid *Barrels, Bags,* &c. by the *Tare*, and ſubtract the Product from the *Groſs*, the Remainder is the *Neat.*

Note 1. *The Table of Allowance for* Tare, *in the Book of Rates, ſays;*

For Cyprus *and* Smyrna-ſilk.

Bales	*about or above* 300 ℔	*the Tare* per *Bale is*	16
	from 300 *to* 200		14
	from 200 *downwards*		12

For Virginia *Tobacco.*

Hhds.	5 *C. and upwards.*	*the Tare* per Hhd. *is*	100
	from 5 *to* 4 *C.*		90
	from 4 *to* 3 *C.*		80
	under 3 *C.*		70

Sugar from India.

In Casks and Caniſters	*Tare*	$\frac{1}{8}$
In Cheſts and Casks from St. Thome		$\frac{1}{5}$

Oil *from* Candia.

Tare 29 ℔ per *Barrel.*

Note 2. 7½ ℔ *of Oil make a Gallon*; *therefore to reduce* Pounds *into* Gallons, *multiply by* 2, *and divide by* 15.

EXAMPLES.

1. In 16 Hhds. of Tobacco, each 5*C.* 1*qr.* 19℔ Groſs, Tare per Hogſhead 100 ℔, how much Neat Weight? *Anſ.* 72 *C.* 1 *qr.* 20 ℔.

```
                               C.  qr.  ℔
                                5   1   19
                                         4  by the Parts.
   16                          ----------
   100                         21   2   20
   ---- 4  C.  qr.  ℔                    4
28)1600(57(14  1   4           ----------
                        Groſs  86   2   24
                        Tare   14   1    4
                               ----------
                        Neat   72   1   20
                               ----------
```

2. In 70 Bales of *Smyrna* Silk, each 317℔ Groſs, Tare per Bale 16 lb, how many lb Neat? *Anſw.* 22070 lb *Neat.*

3. In 14 Hhds. of Tobacco, weighing Groſs 89 *C.* 2*qrs.* 17 lb, Tare per Hogſhead 100 lb, how much Neat Weight? *Anſw.* 77 *C.* 1*qr.* 17 lb.

4. What is the Neat Weight of 30 Bales of *Cyprus* Silk, each weighing 249 lb Groſs, Tare per Bale 14 lb? *Anſ,* 7050 lb.

CASE

CASE 3.

Q. *When the* Tare *is at ſo much* per Cent. *how is the* Neat *Weight found?*

A. When the *Tare* is an Aliquot Part or Parts of the C. Weight; divide the whole Groſs by the ſaid *Part* or *Parts*, that the Tare is of an C. Weight, and the Quotient thence ariſing gives the *Tare* of the Whole; which ſubtract from the whole *Groſs*, the Remainder is *Neat*.

Note 1. *Figs, Almonds, Argol,* &c. — 14 lb
Caroteels, Butts of Currants &c. 16 per Cent.
Oil in uncertain Caſks, *&c.* — 18

2. *Whatever Part the given* Tare *is of an* C. *Weight; the ſame muſt the whole* Tare *be of the given* Groſs Weight.

EXAMPLES.

1. What is the Neat Weight of 12 Barrols of Argol, Groſs 48C. 3*qrs.* 12lb., Tare 14lb *per Cent.*? *Anſw.* 42C. 3*qrs.*

lb	C.	*qrs.*	lb	
14=$\frac{1}{8}$)	48	3	12	*Groſs*
	6	0	12	*Tare.*
	42	3	0	*Neat.*

2. In 12 Butts of Currants, each 7C. 1*qr.* 10lb Groſs, Tare *per Cent.* 16lb, how much Neat Weight? *Anſw.* 75C. 1 *qr.* 26lb. 14*oz.*

3. What is the Neat Weight of 30 Barrels of Figs, each 2 C. 3*qrs.* Groſs. Tare *per Cent.* 14lb? *Anſw.* 72 C. 21lb.

Note, *When the* Tare *is not the aliquot Part or Parts of a* C. Weight, *then multiply the* Pounds Groſs *by the* Tare per Cent. *given, and that Product divide by* 112 *the Quotient is the whole* Tare, *which ſubtract from the* Groſs, *the Remainder is* Neat.

4. What is the Neat Produce of 20 Barrels of Anchovies, each Groſs 33 lb Tare *per Cent.* 10 lb? *Anſ.* 601 lb. 2 *oz.*

5. What is the Neat Produce of 17 Barrels of Pot-aſh, each Groſs 203 lb, Tare 10 lb *per Cent.*? *Anſw.* 3142lb 14*oz.*

CASE 4.

Q. *When the* Tare *is at ſo much in the whole* Groſs Weight; *how is the* Neat Weight *found?*

A. Subtract the *Tare* from the *Groſs*, and the Remainder is *Neat*.

EXAMPLES.

1. What is the Neat Weight of 38 Hogſheads of Tobacco, weighing Groſs 201*C.* 3*qrs.* 12lb Tare in the whole 3140lb? *Anſw.* 173*C.* 3*qrs.* 8lb.

2. What is the Neat Weight of 3 Hogſheads of Tobacco, weighing as follows, *viz.*

	C.	*qrs.*	lb		lb
N°. 1	3	1	2	Tare	80
2	3	2	1		80
3	5	1	12		100

Anſw. 9*C.* 3*qr.* 7lb.

CASE 5.

Q. *How is the* Neat Weight *found, when* Trett *is allowed with* Tare?

A. Divide the *Pounds Suttle* by 26, the Quotient is the Trett, which ſubtract from the *Suttle*, the Remainder is *Neat.*

EXAMPLES.

1. In 8*C.* 3*qrs.* 20lb Groſs, Tare 38lb, Trett 4lb *per* 104lb, how many lb Neat? *Anſw.* 925 lb *Neat.*

2. In 177*C.* 0*qr.* 22lb Groſs, Tare 9lb *per Cent.* Trett 4lb *per* 104lb, how many C. Weight Neat? *Anſw.* 156 *C.* 2*qrs.* 22lb.

3. In 17 Cheſts of Sugar, weighing 120 *C.* 2*qrs.* Groſs, Tare 176lb, Trett 4lb per 104lb how many C. Weight Neat? *Anſw.* 114*C.* 1*qr.* 12lb.

Note, *There are other Allowances not ſo common, ſuch as* Break, *which is at ſo much* per *Barrel, Bag,* &c. *and* Damage, *which is ſo much in the Whole, but they are eaſy.*

Of APOTHECARIES WEIGHT.

1. In 12lb 1℥ 2ʒ 0℈ 1*gr.* how many Grains? *Anſw.* 69721 *Grains.*

2. In 69721 Grains, how many ℈ ʒ ℥ and lb? *Anſw.* 12lb 1℥ 2ʒ 0℈ 1*gr.*

Of LONG MEASURE.

1. In 70 Miles how many Furlongs and Poles? *Anſ.* 560 *Furlongs*, 22400 *Poles.*

2. In 40 Yards how many Feet, Inches and Barley-corns? *Anſw.* 120 *Feet*, 1440 *Inches*, 4320 *Barley-corns.*

3. In 5 Miles how many Barley-corns? *Anſw.* 950400 *Barley-corns, Iriſh* 1209600

4. How many Barley-corns in a Mile? *Anſw.* 190080 *Barley corns. Iriſh* m. 241920.

5. How many Barley-corns will reach round the Globe of the Earth, which is 360 Degrees, and each Degree 69 Miles and a Half *Eng.*? *Anſw.* 4755801600 *Barley-corns.*

6. In 15840 Yards, how many Miles and Leagues? *Anſw.* 9 *Miles*, 3 *Leagues*, *Iriſh* m. 7 *Miles*, or 2 *Leagues* 1 *Mile.*

7. In 4 Leagues, how many Yards? *Anſw.* 21120 *Yards.* *Iriſh* 26880 *Yards.*

8. How many times doth the Wheel, which is 18 Feet 6 Inches round, turn between *London* and *York*, which is 150 Miles? *Anſw.* 42810 *times*, and 180 *Inches* over.

9. In 4000 Inches, how many Yards? *Anſw.* 111 *Yds.* 4 *In.*

Of CLOTH MEASURE.

1. In 14 Yards how many Quarters and Nails? *Anſw.* 56 *Qrs.* 224 *Nails.*

2. In 17 *Yds.* 1 *qr.* 2 *na.* how many Nails? *Anſw.* 278 *Na.*

3. In 4712 Nails how many Yards? *Anſw.* 294 *Yds.* 2 *qrs.*

4. In 47128 Nails of Holland, how many Pieces, each 12 Yards? *Anſw.* 245 *Pieces*, 5 *Yds.* 2 *qrs.*

5. In 4 Pieces of Cloth, each 14 Yards, how many Quarters and Nails? *Anſw.* 224 *Qrs.* 896 *Nails.*

6. In 10 Bales of Cloth, each 10 Pieces, each 12 Yards, how many Yards? *Anſw.* 1200 *Yds.*

7. In 7200 Nails of Holland how many Ells? *Anſ.* 350 *Ells.*

8. Reduce 42 Ells into Quarters and Nails. *Facit*, 210 *Qrs.* 840 *Nails.*

Of LAND MEASURE.

1. In 40 Acres how many Roods and Perches? *Anſw.* 160 *Roods* 6400 *Perches.*

2. In 17 *A.* 3 *r.* 10 *p.* how many Perches? *Anſ.* 2850 *Per.*

3. Reduce 2850 Perches into Acres. *Facit*, 17 *A.* 5 *r.* 10 *p.*

4. If a Piece of Ground contain 24 Acres, and an Incloſure of 17 Acres 3 Roods to be taken out of it, how many Perches are there in the Remainder? *Anſw.* 1000 *Perches.*

5. One Field contains 7 Acres, another 10 Acres, and a third 12 Acres, 1 Rood, how many Shares, of 76 Perches each, are contained in the Whole? *Anſw*, 61 *Shares*, and 44 *Perches* over.

Of LIQUID MEASURE

1. In 17 Gallons how many Quarts and Pints? *Anſw.* 68 *Qts.* 136 *Pints.*

2. In 10 Barrels of Beer how many Gallons and Quarts? *Anſw.* 360 *Gals.* 1440 *Qts.* *Iriſh* 400 *Gals.* or 1600 *Qts.*

3. In 4 Barrels of Ale how many Gallons? *Anſ.* 128 *Gal. Iriſh* 160 *Gals.*

4. In 72 Hogſheads of Beer how many Barrels? *Anſw.* 108 *Barrels.*

5. In 91 Barrels of Beer how many Hogſheads? *Anſw.* 60 *Hhds.* 36 *Gals.*

6. If a Back contains 30 Barrels of Beer, how many Gallons doth it hold? *Anſw.* 1080 *Gals. Iriſh* 1200 *Gal.*

7. In 4 Tuns of Oil, how many Hogſheads, Gallons and Quarts? *Anſw.* 16 *Hhds.* 1008 *Gals.* 4032 *Qts.*

8. In 3 Hogſheads of Brandy how many Half Anchors? *Anſw.* 37 *Half-anchors,* 4 *Gals.*

9. In 1712 Gallons of Wine how many Hogſheads? *Anſ.* 27 *Hhds.* 11 *Gals.*

10. If a Vintner be deſirous to draw off a Pipe of Canary into Bottles, containing Pints, Quarts and two Quarts, and of each an equal Number, how many muſt we have? *Anſw.* 144 *of each Sort.*

Of DRY MEASURE.

1. In 40 Quarters of Wheat how many Buſhels and Pecks? *Anſw.* 320 *Buſh.* 1280 *Pecks.*

2. Reduce 1280 Pecks of Wheat into Quarters. *Facit,* 40 *Qrs.*

3. In 30 Chaldron of Coals each 36 Buſhels, how many Pecks? *Anſw.* 4320 *Pecks.*

4. Reduce 7094 Pecks of Coals into Chaldrons, *Facit* 49 *Chal.* 9 *Buſh.* 2 *Pecks.*

Of TIME.

1. In 121812 Seconds how many Hours? *Anſw.* 33 *Hrs.* 50 *Min.* 12 *Sec.*

2. Reduce 41 Weeks into Days, Hours and Minutes *Facit,* 287 *Days,* 6888 *Hrs.* 413280 *Min.*

3. Reduce 413280 Minutes into Weeks. *Facit* 41 *Weeks*

4. How many Days have paſſed ſince the Birth of Chriſt, to Chriſtmas 1762? *Anſw.* 643570 *Days* 12 *Hrs.*

5. How many Seconds in a Year, allowing it to be 365 Days, 6 Hours? *Anſw.* 31557600 *Sec.*

6. From *March* 2 to *November* 19 following (incluſive) how many Days? *Anſw.* 263 *Days.*

Of MOTION.

1. In half a Year's Time the Sun makes his Progreſs thro' ſix Signs of the Zodiac, how many Degrees, Minutes and Seconds doth that amount to? *Anſw.* 180 *Deg.* 10800 *Min.* 648000 *Sec.*

Of the Single Rule *of* Three.

Q. HOW *many Parts are there in the* Rule *of* Three?

A. Two; *Single* or *Simple*, and *Double* or *Compound*.

Q. *By what is the* Single Rule *of* Three *known?*

A. By *Three Terms*, which are always given in the Queſtion to find a *Fourth*.

Q. *Are any of the* Terms *given, to be reduced from one* Denomination *to another?*

A. If any of the given *Terms* be of ſeveral *Denominations*, they muſt be reduced into the loweſt *Denomination* mention'd.

Q. *What do you obſerve concerning the* firſt *and* third Terms?

A. They muſt be of the ſame Name and Kind.

Q. *What do you obſerve concerning the* fourth Term?

A. It muſt be of the ſame Name and Kind with the *ſecond*.

Q. *What do you obſerve of the three given* Terms *taken together?*

A. That the two firſt are a *Suppoſition*, the laſt is a *Demand*.

Q. *How is the* third Term *known?*

A. It is known by theſe, or the like Words, *What coſt? How many? How much?*

Q. *How many Sorts of* Proportion *are there?*

A. Two; *Direct* and *Inverſe*.

1. *Of* DIRECT PROPORTION.

Q. *What is* Direct Proportion?

A. *Direct Proportion* is when *more* requires *more*, or *leſs* requires *leſs*.

Q. *What do you mean by* more requires more, *and* leſs requires leſs?

A. *More requires more* is when the third Term is *greater* than the firſt, and therefore requires the fourth Term to be *greater* than the ſecond in the ſame Proportion: And *leſs* requires *leſs* is when the third Term is *leſs* than the firſt; and therefore requires the fourth Term to be *leſs* than the ſecond in the like Proportion.

Q. *How is the fourth Term in* Direct Proportion *found?*

A. By multiplying the ſecond and third Terms together, and dividing the Product by the firſt Term.

Q. *What Proportion does the fourth Number bear to any other?*

A. It bears the ſame Proportion to the ſecond as the third does to the firſt.

Q. *How do you prove Queſtions in the* Rule *of* Three Direct?

A. By changing their Order.

EXAMPLES.

1. If 3 *oz.* of Silver coſt 17*s* what will 48 *oz.* coſt? *Anſ.* 13*l.* 12*s.*

```
Oz.  s.    Oz.
 3 : 17 :: 48
           17
         ——— 20  l.  s.
       3)816(272(13 12
```

1. If 3lb of Ginger coſt 3 *s.* what coſt 26 lb? *Anſ.* 1*l.* 6*s.*

3. If 2 *oz.* of Silk coſt 2*s* 6*d.* what coſt 7lb? *Anſw.* 7 *l.*

4. If 1 Gallon of Ale coſt 8*d.* what coſt 36 Gallons? *Anſw.* 1*l.* 4*s.*

5. If 1lb of Sugar coſt 4$\frac{1}{2}$*d.*, what coſt 48 lb? *Anſw.* 18*s.*

6. If 1lb of Sugar coſt 4*a.* what coſt 1 *C.*? *Anſ.* 1*l.* 17*s.* 4*d.*

7. If an *C.* of Sugar coſt 2*l.* 12*s.* what coſt 1lb? *Anſw.* 5*d.* 2*qrs.* $\frac{32}{112}$.

8. If 1 Gallon of Beer coſt 4*d* what coſt a Barrel? *Anſ.* 12*s.* Iriſh mea. 13*s.* 4*d.*

9. If 1 Pair of Stockings coſt 2*s.* 3*d.* what coſt 19 Doz. Pair? *Anſw.* 25*l.* 13*s.*

10. If 19 Dozen Pair of Shoes coſt 25*l.* 13*s.* what coſt 1 Pair? *Anſw.* 2*s.* 3*d.*

11. Bought a Firkin of Butter, containing 56lb for 18*s.* 8*d.* what is that *per* lb? *Anſw.* 4*d.*

12. Sold 3 *C.* Weight of Tobacco, at 18*d. per* lb, what is the Price of the Whole? *Anſw* 25*l.* 4*s.*

13. Bought 19 Chaldrons of Coals, at 29*s.* 6*d.* per Chaldron, what come they to? *Anſw.* 28*l.* 0*s.* 6*d.*

14. If 1lb of Sugar coſt 9*d.* what coſt 17 *C.* 2*qrs.* *Anſw.* 73*l.* 10*s.*

15. If 1 *oz.* of Silver coſt 5*s.* 6*d.* what is the Price of a Tankard that weighs 1 lb 10 *oz.* 10 *dwts.* 4 *gr.*? *Anſw.* 6*l.* 3*s.* 9*d.* 2*qrs.* $\frac{96}{480}$.

16. If 1lb of Tobacco coſt 15*d.* what coſt 3 *hhds.* weighing together 15 *C.* 1*qr.* 19lb? *Anſw.* 107*l.* 18*s.* 9*d.*

17. If a Yard of Cloth is worth 14*s.* what is the Worth of 5 Pieces, each 19 Yards? *Anſw.* 66*l* 10*s.*

18. If an Ell of Holland coſt 4*s.* 6*d.* what is the Value of 5 Pieces, each 12 Ells? *Anſw.* 13*l.* 10*s.*

19. If a Buſhel of Coals coſt 10*d.* how many Chaldron for 100*l*? *Anſw.* 66 *Chal.* 24 *Buſh.*

20. How many Quarters of Corn for 40 Guineas, at 4 *s.* per Buſhel? *Anſw.* 26 *Qrs.* 2 *Buſh.*

21. If a Man's yearly Income be 300*l.* what is it per Day? *Anſw.* 16*s.* 5*d.* 1*qr.* $\frac{15}{365}$.

22. If a Man ſpend 7*d.* per Day, how much is that in a Year? *Anſw.* 10*l.* 12*s.* 11*d.*

23. If a Pint of Wine coſt 10*d.* what coſt 3*hhds.*? *Anſ.* 63*l.*

24. If a Pipe of Canary coſt 40*l.* how much is that per Pint? *Anſw.* 9*d.* 2*qrs.* $\frac{16}{1008}$.

25. Bought 12 Pieces of Cloth, each 12 Yards. at 10*s.* 6*d.* per Yard, what come they to? *Anſw.* 75*l.* 12*s.*

26. What coſt 120 Yards of Cloth, at 3*s.* per Yard? *An.* 18*l.*

27. A Merchant bought 4 Pieces of Holland, each 12 Ells, for 7*l.* 10*s.* what did 1 Ell coſt? *Anſw.* 3*s.* 1*d.* $\frac{1}{2}$.

28. A Grocer bought 3 *hhds.* of Sugar, each 10 *C.* 3 *qrs.* 12℔ Groſs, Tare 26 ℔ per *hhd.* at 2*d.* $\frac{1}{2}$ per ℔ I demand what the 3 *hhd.* come to? *Anſw.* 37*l.* 3*s.* 9*d.*

29. How much muſt I pay for the Carriage of 10 *C.* $\frac{1}{2}$, at the Rate of 1*d.* $\frac{1}{2}$ per lb? *Anſw.* 7*l.* 7*s.*

30. If 6 Horſes eat up 21 Buſhels of Oats in a Week's time, how many Buſhels will ſerve 20 Horſes the ſame time? *Anſw.* 70 *Buſh.*

31. If a Family of 10 Perſons ſpend 3 Buſhels of Malt in a Month, how many Buſhels will ſerve them when they are 30 in Family? *Anſw.* 9 *Buſh.*

32. If an Ingot of Silver weigh 36 *oz.* 10 *dwt.* what is it worth, at 5*s.* per *oz.*? *Anſw.* 9*l.* 2*s.* 6*d.*

33. How many Yards of Lace for 100*l.* at 3*s.* 6*d.* per Yard? *Anſw.* 571 *Yds.* $\frac{18}{42}$.

34. If a Merchant hath owing to him 1000*l* and his Debtor doth agree to pay him for every Pound 12*s.* 6*d.* I demand how much he muſt pay in all? *Anſw.* 625 *l.*

35. A Goldſmith ſold a Tankard for 10*l.* 12*s.* at the Rate of 5*s.* 4*d.* per *oz.* I demand the Weight of it? *Anſw.* 39*oz.* 15 *dwts.*

36. A Man bought a Piece of Cloth for 16*l.* 10*s.* at 15*s.* per Yard, how many Yards did it contain? *Anſw.* 22 *Yds.*

37. If 1 *C* Weight of Cheeſe coſt 37*s.* 4*d.* what is that per ℔? *Anſ.* 4*d.*

38. Coals at 33*s.* per Chaldron, how much per Buſhel? *Anſw.* 11*d.*

39. What coſt 49392 Caſe-knives, at 4*s.* 4*d.* per Dozen? *Anſw.* 891 *l.* 16*s.*

40. If a Gentleman has an Eſtate of 245*l.* 10*s.* a Year, how much may he ſpend one Day with another, to lay up 60 Guineas at the Year's end? *Anſw.* 10*s. per Day.*

41. If 1 *C* 3*qrs* 17lb of Tobacco, coſt 133 *l.* 13 *s.* 4 *d.* what coſt 1 *oz.* *Anſw.* 1 *d.*

42. If 1 *C.* Weight of Lead coſt 15 *s.* 11 *d.* what coſt 5 Fother? *Anſw.* 77*l.* 11*s.* 10*d.* $\frac{1}{2}$.

43. When the Ton of Wine coſt 24 *l.* what coſt 1 Quart? *Anſw.* 10*d.*

44 At a Noble per Week, how many Weeks Board may I have for 50*l.* *Anſ.* 37 *Months*, 2 *Weeks.*

45. What coſt a Pack of Wool, weighing 2*C.* 1*qr.* 19lb at 8*s.* 6*d.* per Stone? *Anſw.* 8*l.* 4*s.* 6*d.* 1*qr.* $\frac{10}{14}$. *Iriſh* 7 *l.* 2*s.* 11*d.* $\frac{5}{8}$.

46. What is Cheeſe per *C.* Weight, at 3*d.* $\frac{1}{2}$ per lb *Anſw.* 1*l.* 12*s.* 8*d.*

47. If a Yard of Cambrick coſt 12*s.* what coſt 4 Pieces, each 20 Yards? *Anſw.* 48*l.*

48. If a Yard of Broad Cloth coſt 18*s.* what coſt 5 Pieces each 20 Yards? *Anſw.* 90*l.*

49. If Lead be ſold for 1*d.* $\frac{1}{2}$ per lb what is 3 *C.* Weight worth? *Anſw.* 2*l.* 2*s.*

50. If Coffee be ſold for 8*d.* $\frac{1}{4}$ per *oz.* what is 6 *C.* Weight worth? *Anſw.* 369 *l.* 12*s.*

2. *Of* INVERSE PROPORTION.

Q. *What is* Inverſe Proportion?

A. Inverſe Proportion is when *more* requires *leſs*, or *leſs* requires *more*?

Q. *What is meant by* more requires leſs, *and* leſs requires more?

A. More requires leſs is when the third Term is *greater* than the firſt, and requires the fourth Term to be *leſs* than the ſecond: And *leſs requires more* is when the third Term is *leſs* than the firſt, and requires the fourth Number to be *greater* than the ſecond.

Q. *How is the fourth Term in* Inverſe Proportion *found?*

A. By multiplying the firſt and ſecond *Terms* together, and dividing that Product by the *third Term*

Q. *What* Proportion *does the* fourth Term *bear to any of the reſt?*

A. It bears ſuch Proportion to the *ſecond*, as the *firſt* does to the *third.*

Examples.

EXAMPLES.

1. If 48 Men can build a Wall in 24 Days, how many Men can do the ſame in 192 Days; *Anſw.* 6 *Men.*

2. If I lend my Friend 100 *l.* for 6 Months (allowing the Month to be 30 Days) how long ought he to lend me 1000 *l.* to requite my Kindneſs? *Anſw.* 18 *Days.*

3. If 100 *l.* in 12 Months gain 6 *l.* Intereſt, what Principal will gain the ſame in 8 Months? *Anſw.* 150 *l.*

4. If a Footman perform a Journey in 3 Days, when the Days are ſixteen Hours long, how many Days will he require of 12 Hours long to go the ſame Journey in? *Anſw.* 4 *Days.*

5. How many Yards of Matting, that is half Yard wide, will cover a Room that is 18 Feet wide, and 30 Feet long? *Anſw.* 120 *Yards.*

6. If 28 *s.* will pay for the Carriage of an *C.* Weight 150 Miles; how far may 6 *C.* Weight be carried for the ſame Money? *Anſw* 25 *Miles.*

7. How much in length, that is 3 Inches broad, will make a Foot ſquare? *Anſw.* 48 *Inches.*

8. If 15 Shillings worth of Wine will ſerve 46 Men, when the Tun is worth 12 *l.* how many Men will the ſame 15 Shillings worth ſuffice, when the Tun is worth but 8 *l.*? *Anſw.* 69 *Men.*

9. If when the Price of a Buſhel of Wheat is 6 *s.* 3 *d.* the Penny-loaf will weigh 9 *oz.* what muſt the Penny-loaf weigh when Wheat is at 4*s.* 6 *d* the Buſhel? *Anſ.* 12 *oz.* 10 *dwts.*

10. Suppoſe 800 Soldiers were placed in a Garriſon, and their Proviſions were computed ſufficient for 2 Months; how many Soldiers muſt depart, that the Proviſions may ſerve them 5 Months? *Anſw.* 480 *Men.*

11. There is a Ciſtern having a Cock which will empty it in 12 Hours; I demand how many Cocks of the ſame Capacity there muſt be to empty it in a Quarter of an Hour? *Anſw.* 48 *Cocks.*

12. There was a certain Building raiſed in 8 Months, by 120 Workmen, but the ſame being demoliſhed, it is required to be rebuilt in two Months; I demand how many Men muſt be employed about it? *Anſw.* 480 *Men.*

13. A Piece of Tapeſtry is 3 Ells Flemiſh wide, and 4 Ells Flemiſh long, and it is required to be lined with ſomething that is but 3 Quarters of a Yard wide; I demand how many Yards there muſt be to complete the Lining? *Anſw.* 9 *Yards.*

Of PRACTICE.

Q. W*HAT is* Practice?

A. It is a ſhort Way of finding the Value of any Quantity of Goods, by the given Price of one Integer.

Q. *How do you prove Queſtions in* Practice?

A. By the ſingle Rule of three Direct: Or *Practice* may be proved by itſelf, by varying the Parts.

The TABLES.

s.	d.	l.	s.	d.	l.	s.	d.	Cwt.	lb.
$\frac{1}{2}$ is	6	$\frac{1}{2}$ is	10	0	$\frac{1}{15}$ is	1	4	$\frac{1}{2}$ is	56
$\frac{1}{3}$	4	$\frac{1}{3}$	6	8	$\frac{1}{16}$	1	3	$\frac{1}{4}$	28
$\frac{1}{4}$	3	$\frac{1}{4}$	5	0	$\frac{1}{20}$	1	0	$\frac{1}{7}$	16
$\frac{1}{6}$	2	$\frac{1}{5}$	4	0	$\frac{1}{30}$	0	8	$\frac{1}{8}$	14
$\frac{1}{8}$	$1\frac{1}{2}$	$\frac{1}{6}$	3	4	$\frac{1}{40}$	0	6	$\frac{1}{14}$	8
$\frac{1}{12}$	1	$\frac{1}{8}$	2	6	$\frac{1}{60}$	0	4	$\frac{1}{16}$	7
		$\frac{1}{10}$	2	0	$\frac{1}{80}$	0	3		
		$\frac{1}{12}$	1	8	$\frac{1}{120}$	0	2		

CASE I.

Q. *What muſt be done with the Price of an* Integer *when it is leſs than a Penny?*

A. Find the aliquote Parts of that Price contained in a *Penny* which muſt be *Diviſors* to the given Sum; that is, if the *Price* be a Farthing ſay, a Farthing is the Fourth of a Penny, and ſet it thus, | $\frac{1}{4}$ | $\frac{1}{4}$ | if the Price be a Halfpenny, then ſay, a Halfpenny is the half, thus, | $\frac{1}{2}$ | $\frac{1}{2}$ | if it is three Farthings, then ſay, a Halfpenny is the half of a Penny, and a Farthing is the Fourth of a Penny, thus, $\left|\begin{array}{c|c}\frac{1}{2} & \frac{1}{2}\\ \frac{1}{4} & \frac{1}{4}\end{array}\right|$

Q. *What do you obſerve concerning theſe Columns?*

A. The firſt Column contains the *Money*, and the other the *Parts.*

Note 1. *When there are more* aliquote Parts *than one, their* Quotients *muſt be added together, and the Sum, if the firſt* aliquote Part *be taken from a* Penny, *will be* Pence; *if it be taken from a* Shilling, *will be* Shillings; *or if it be taken from a* Pound, *will be* Pounds.

2. *It is frequently better to take* Parts *of* Parts, *than* Parts *of the* whole Price; *and then the* three Farthings *above mentioned may as well be taken thus* $\left|\begin{array}{c|c}\frac{1}{2} & \frac{1}{2}\\ \frac{1}{4} & \frac{1}{2}\end{array}\right|$ *that is a* Halfpenny *is the* half *of a* Penny, *and a* Farthing *is the* half *of a* Halfpenny.

Examples,

EXAMPLES.

¼	¼	7612 *at* ¼
	12	1903
	2|0	15|8 7
		7*l.* 18*s.* 7*d.*

½	½	6812 *at* ½
		3406
	12	28|3 10
	2|0	14*l.* 3*s.* 10*d.*

½	½	4712 *at* ¾
¼	½	2356
		1178
	12	3534
	2|0	29|4 6
		14*l.* 14*s.* 6*d.*

1280 *at* ¼

Facit 1*l.* 6*s.* 8*d.*

7672 *at* ½

Facit 15*l.* 19*s.* 8*d.*

9180 *at* ¾

Facit 28*l.* 13*s.* 9*d.*

CASE 2.

Q. *What muſt be done with the Price of an* Integer, *when it is leſs than a* Shilling?

A. Find the aliquot Parts of that Price contained in a *Shilling*, which muſt be Diviſors to the given Sum. Or thus,

If the given *Price* be not the aliquot Part of a *Shilling*, then firſt take ſome Part of it that is an aliquot Part; and for the remaining Part of the *Price*, let it be taken out of the foregoing Part or Parts, and then add the Quotients together as before; the Total will be the Anſwer in *Shillings*.

EXAMPLES.

1	1/12	7612 *at* 1*d.*
	2|0	63|4 4
		31*l.* 14*s.* 4*d.*

1	1/12	8612 *at* 1*d.* ¼
¼	¼	717 8
		179 5
	2|0	89|7 1
		44*l.* 17*s.* 1*d.*

6812 *at* 1*d.*

Facit 28*l.* 7*s.* 8*d.*

1861 *at* 1*d.* ¼

Facit 9*l.* 13*s.* 10*d.* ¼.

4121 *at* 1*d.* ½.

Facit 25*l.* 15*s.* 1*d.* ½.

1861 at 1*d.* ¾

Facit 13*l.* 11*s.* 4*d.* ¾

4761 at 2*d.*

Facit 39*l.* 13*s.* 6*d.*

6181 at 2*d.* ¼

Facit 57*l.* 18*s.* 11*d.* ¼

1281 at 2*d.* ½

Facit 12*l.* 13*s.* 9*d.*

8012 at 2*d.* ¾

Facit 91*l.* 16*s.* 1*d.*

7612 at 3*d.*

Facit 95*l.* 3*s.*

6128 at 3*d*, ½

Facit 82*l.* 19*s.* 8*d.*

6180 at 3*d* ½

Facit 90*l.* 2*s.* 6*d.*

7812 at 3*d.* ¾

Facit 122*l.* 1*s*, 3*d.*

8120 at 4*d.*

Facit 135*l.* 6*s.* 8*d.*

7000 at 4*d.* ¼

Facit 123*l.* 19*s.* 2*d.*

6001 at 4*d.* ½

Facit 112*l.* 10*s.* 4*d.* ½

7121 at 4*d.* ¾

Facit 140*l.* 18*s.* 8*d.* ¾

7181 at 5*d.*

Facit 149*l.* 12*s.* 1*d.*

8124 at 5*d.* ¼

Facit 177*l.* 12*s.* 11*d.* ¼

6128 at 5*d.* ½

Facit 140*l.* 8*s.* 8*d.*

6100 at 5*d.* ¾

Facit 146*l.* 2*s.* 11*d.*

1000 at 6*d.*

Facit 25*l.*

7610 at 6*d.* ¼

Facit 198*l.* 3*s.* 6*d.* ½

1218 at 6*d.* ½

Facit 32*l.* 19*s.* 9*d.*

6000 at 6*d.* ¾

Facit 168*l.* 15*s.*

7101 at 7*d.*

Facit 207*l.* 2*s.* 3*d.*

1001 at 7*d.* ¼

Facit 30*l.* 4*s.* 9*d.* ¼

4100 at 7*d.* ½

Facit 128*l.* 2*s.* 6*d.*

6120 at 7*d.* ¾

Facit 197*l.* 12*s.* 6*d.*

7100 at 8*d.*

Facit 236*l.* 13*s.* 4*d.*

6100 at 8*d.* ¼

Facit 209*l.* 13*s.* 9*d.*

8000 at 8*d.* ½

Facit 283*l.* 6*s.* 8*d.*

6000 at 8*d.* ¾

Facit 218*l.* 15*s.*

9000 at 9*d.*

Facit 337*l.* 10*s.*

4121 at 9*d.* ¼

Facit 158*l.* 16*s.* 7*d.*

6100 at 9*d.* ½

Facit 241*l.* 9*s.* 2*d.*

5918 at 9*d.* ¾

Facit 240*l.* 8*s.* 4*d.* ½

8121 at 10*d* *

Facit 338*l.* 7*s.* 6*d.*

6712 at 10*d.* ¼

Facit 286. 13*s.* 2*d.*

1002 at 10*d.* ½

Facit 43*l.* 16*s.* 9*d.*

4680 at 10*d.* ¾

Facit 209*l.* 12*s.* 6*d.*

1260 at 11*d.*

Facit 57*l* 15*s.*

6121 at 11*d.* ¼

Facit 286*l.* 18*s.* 5*d.* ¼

1234 at 11*d.* ½

Facit 59*l.* 2*s.* 7*d.*

2345 at 11*d.* ¾

Facit 114*l.* 16*s.* 1*d.* ¾

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* Note, *When the Price of an* Integer *is* 10*d. annex a* Cypher *to the given Number, and divide by* 12 *and by* 20.

Caſe

CASE 3.

Q. *What muſt be done with the Price of an* Integer, *when it is greater than a* Shilling, *but leſs than two* Shillings?

A. Let the *Part* or *Parts* be taken only with ſo much of the given *Price* as is more than one *Shilling*; that is, if the *Price be* 4*d.* ½, take the Parts only with 2*d.* ½, and let the given Quantity ſtand for Shillings, which muſt be added with the reſt; and the Total will be the Anſwer in Shillings.

EXAMPLES.

¼ | ¼ | 4 8 6 at 12*d.* ¼
12 | 1 2 1 ½
1 0 1 ½
2|0 | 4 9|6 1 ½
2 4*l.* 16*s.* 1*d.* ½

½ | ½ | 4 8 6 at 12*d.* ½
12 | 2 4 3
2 0 3
2|0 | 5 0|6 3
2 5*l.* 6*s.* 3*d.*

7612 at 12*d.* ¼

Facit 388*l.* 10*s.* 7*d.*

1216 at 12*d.* ½

Facit 63*l.* 6*s.* 8*d.*

1216 at 12*d.* ¾

Facit 64*l.* 12*s*

6121 at 13*d.*

Facit 331*l.* 11*s.* 1*d.*

1281 at 13*d.* ¼

Facit 70*l.* 14*s.* 5*d.* ¼

6100 at 13*d.* ½

Facit 343*l.* 2*s.* 6*d.*

1210 at 13*d.* ¾

Facit 69*l.* 6*s.* 5*d.* ½

1210 at 14*d.*

Facit 70*l.* 11*s.* 8*d.*

1271 at 14*d.* ¼

Facit 75*l.* 9*s.* 3*d.* ¾

6120 at 14*d.* ½

Facit 369*l.* 15*s.*

1210 at 14*d.* ¾

Facit 74*l.* 7*s.* 3*d.* ½

1260 at 15*d.*

Facit 78*l.* 15*s.*

1612 at 15*d.* ¼

Facit 102*l.* 8*s.* 7*d.*

1210 at 15*d.* ½

Facit 78*l.* 2*s.* 11*d.*

7612 at 15*d.* ¾

Facit 499*l.* 10*s.* 9*d.*

6100 at 16*d.*

Facit 406*l.* 13*s.* 4*d.*

7121 at 16*d.* ¼

Facit 482*l.* 3*s.* 0*d.* ¼

1218 at 16*d.* ½

Facit 83*l.* 14*s.* 9*d.*

8100 at 16*d.* ¾

Facit 565*l.* 6*s.* 3*d.*

4128 at 17*d.*

Facit 292*l.* 8*s.*

1230 at 17*d.* ¼

Facit 88*l.* 8*s.* 1*d.* ½

2340 at 17*d.* ½

Facit 170*l.* 12*s.* 6*d.*

3450 at 17*d.* ¾

Facit 255*l* 3*s.* 1*d.* ½

4560 at 18*d.*

Facit 342*l.*

5670 at 18*d.* ¼

Facit 431*l.* 3*s.* 1*d.* ½

6789 at 18*d.* ½

Facit 523*l.* 6*s.* 4*d.* ½

7890 at 18*d.* ¾

Facit 616*l.* 8*s.* 1*d.* ½

8900 at 19*d.*

Facit 704*l.* 11*s.* 8*d.*

9000 at 19*d.* ¼

Facit 721*l.* 17*s.* 6*d.*

5876 at 19*d.* ½

Facit 802*l.* 8*s.* 6*d.*

8765 at 19*d.* ¾

Facit 721*l.* 5*s.* 8*d.* ¼

7120 at 20*d.* ¼

Facit 600*l.* 15*s.*

6543 at 20*d.* ½

Facit 558*l.* 17*s.* 7*d.* ½

5432 at 20*d.* ¾

Facit 469*l.* 12*s.* 10*d.*

4321 at 21*d.*

Facit 378*l.* 1*s.* 9*d.*

3210 at 21*d.* ¼

Facit 284*l.* 4*s* 4*d.* ½

2100 at 21*d.* ½

Facit 188*l.* 2*s.* 6*d.*

1000 at 21*d.* ¾

Facit 90*l.* 12*s.* 6*d.*

1090 at 22*d.* *

Facit 99*l.* 18*s.* 4*d.*

9010 at 22*d.* ¼

Facit 835*l.* 6*s.* 0*d.* ½

6700 at 22*d.* ½

Facit 628*l.* 2*s.* 6*d.*

6812 at 22*d.* ¾

Facit 645*l.* 14*s.* 5*d.*

1210 at 23*d.*

Facit 115*l.* 19*s.* 2*d.*

1800 at 23*d.* ¼

Facit 174*l.* 7*s.* 6*d.*

6760 at 23*d.* ½

Facit 661*l.* 18*s.* 4*d.*

9990 at 23*d.* ¾

Facit 98*l.* 11*s.* 10*d.* ½

* Note, *When the Price of an* Integer is 22 d. *annex a* Cypher *to the given Number*, and *divide by* 12 (*as at* 10d.) *then add both Lines together*; *the Sum will be the* Total *in* Shillings.

C A S E IV.

Q. *What muſt be done with the Price of an* Integer *when it is any even Number of* Shillings *under* 20, as 6*s.* 8*s.* &c.

A. Multiply the given *Quantity* by half of the *Price,* and double the firſt Figure of the Product for *Shillings,* and the reſt of the Product will be *Pounds.*

E X A M P L E S.

486 at 2*s.*
1

48*l.* 12*s.*

769 at 4*s.*
2

153*l.* 16*s.*

7612 at 2*s.*

Facit 761*l.* 4*s.*

128 *l.* at 4*s.*

Facit 257*l.* 4*s.*

7613

7618 at 6*ſ*.

Facit 2285*l.* 8*ſ*.

191 at 8*ſ*.

Facit 76*l.* 8*ſ*.

180*l.* at 10*ſ*. §

Facit 90*l.*

171 at 14*ſ*.

Facit 119*l.* 14*ſ*.

171 at 16*ſ*.

Facit 136*l.* 16*ſ*.

712 at 18*ſ*.

Facit 640*l.* 16*ſ*.

§ Note, *When the* Price *of an* Integer, *is* 10*ſ*. *you may take half of the given* Integer, *and it is done; and the* Remainder (*if there be any*) *will be* 10 Shillings.

CASE 5.

Q. *What muſt be done with the* Price *of an* Integer, *when it is any odd Number of* Shillings *under* 20, at 3*ſ*. 5*ſ*. &c.

A. Multiply the given *Integer* by the *Price*, and that Product divide by 20, the Quotient will be the *Anſwer*.

EXAMPLES.

121 at 1*ſ*.

Facit 6*l.* 1*ſ*.

121 at 3*ſ*.

Facit 18*l.* 3*ſ*.

471 at 5*ſ* §

Facit 117*l.* 15*ſ*.

860 at 7*ſ*.

Facit 301*l.*

612 at 9*ſ*.

Facit 275*l.* 8*ſ*.

121 at 11*ſ*.

Facit 66*l.* 11*ſ*.

600 at 13*ſ*.

Facit 390*l.*

190 at 15*ſ*.

Facit 142*l.* 10*ſ*.

121 at 17*ſ*.

Facit 102*l.* at 17*ſ*.

100 at 19*ſ*.

Facit 95*l.*

§ Note, *When the Price of an* Integer *is* 5*ſ*. *the Work may be done at once, becauſe* 5*ſ is the* fourth Part *of a Pound.*

CASE 6.

Q. *What muſt be done with the Price of an* Integer, *when it is* Shillings *and* Pence?

A. 1. If the *Shillings* and *Pence* be the *aliquote* Part of a *Pound,* it may be done at once, as 6*s.* 8*d.* is the Third of a *Pound.*

EXAMPLES.

12 at 6*s.* 8*d.*

Facit 4*l.*

69 at 3*s.* 4*d.*

Facit 11*l.* 10*s.*

21 at 2*s.* 6*d.*

Facit 2*l.* 12*s.* 6*d.*

96 at 1*s.* 8*d.*

Facit 8*l.*

2. If the *Shillings* and *Pence* be not the *aliquote* Part of a *Pound,* or if there be *Shillings, Pence* and *Farthings,* multiply the given Quantity by the *Shillings,* and take Parts with the reſt, and add them together; the Sum will be the Anſwer in *Shillings.*

EXAMPLES.

```
3 | ¼ | 126 at 9s. 3d.
      |       9
      ------------------
      | 1134
      |   31  6
     ------------
   20 | 116|5  6
      ------------
      | 58l. 5s. 6d.
```

86 at 6*s.* 10*d.*

Facit 29*l.* 7*s.* 8*d.*

10 at 12*s.* 4*d.*

Facit 6*l.* 3*s.* 4*d.*

30 at 4*s.* 9*d.*

Facit 7*l.* 2*s.* 6*d.*

73 at 7*s.* 6*d.*

Facit 27*l.* 7*s.* 6*d.*

70 at 7*s.* 4*d.* ¾

Facit 25*l.* 17*s.* 8*d.*½

55 at 4*s.* 8*d.*½

Facit 12*l.* 18*s.* 11*d.*½

77 at 10*s.* 6*d.*¼

Facit 40*l.* 10*s.* 1*d.*¼

12 at 13*s.* 10*d.*½

Facit 8*l.* 6*s.* 6*d.*

17 at 17*s.* 4*d.*¼

Facit 14*l.* 15*s.* 0*d.*¼

46 at 7*s.* 3*d.*¾.

Facit 16*l.* 16*s.* 4*d.*½

CASE 7.

Q. *What muſt be done with the Price of an* Integer, *when it is* Pounds *only?*

A. Multiply the given *Integers* by the Price, the Product will be the Anſwer.

EXAMPLES.

72 at 5*l.*	19 at 4*l.*
Facit 360*l.*	*Facit* 76*l.*
64 at 3*l.*	46 at 7*l.*
Facit 192*l.*	*Facit* 322*l.*

CASE 8.

Q. *What muſt be done with the Price of an* Integer, *when it is* Pounds *and* Shillings?

A. Multiply the *Integers* given by the *Pounds*; then proceed with the *Shillings.* if the Number be *even* according to *Caſe* 4; but if the *Shillings* be *odd*, according to *Caſe* 5, and add them together; the Total will be the Anſwer.

EXAMPLES.

2|s 26 at 4*l.* 8*s.*	48 at 7*l.* 10*s.*
4	
	Facit 360*l.*
104	
10 8	26 at 11*l.* 14*s.*
114*l.* 8*s.*	*Facit* 304*l.* 4*s.*
49 at 3*l.* 7*s.*	15 at 4*l.* 13*s.*
7	
34|3	*Facit* 69*l.* 15*s.*
17 3	
147	17 at 9*l.* 15*s.*
164*l.* 3*s.*	*Facit* 165*l.* 15*s.*
36 at 5*l.* 13*s.*	16 at 3*l.* 6*s.*
Facit 203*l.* 8*s.*	*Facit* 52*l.* 16*s.*

CASE 9.

Q. *What muſt be done with the Price of an* Integer, *when it is* Pounds, Shillings *and* Pence?

A. 1 If the *Shillings* and *Pence* be the *aliquote* Parts of a *Pound*, multiply the given *Integers* by the *Pounds*, and divide by the *aliquote* Parts: thoſe Numbers ſo found out, being added together will be the Sum required.

EXAMPLES.

47 at 3*l.* 3*s.* 4*d.*	17 at 2*l.* 6*s.* 8*d.*
Facit 148*l.* 16*s.* 8*d.*	*Facit* 39*l.* 13*s.* 4*d.*
20 at 4*l.* 13*s.* 4*d.*	30 at 1*l.* 2*s.* 6*d.*
Facit 93*l.* 6*s.* 8*d.*	*Facit* 33*l.* 15*s.*

2. If the *Shillings* and *Pence* be not the *aliquote* Parts of a *Pound*, or if there be *Shillings*, *Pence* and *Farthings* given with the *Pounds*, then reduce the Pounds and Shillings into Shillings, and multiply the given Integers by the ſaid Shillings; next take Parts with the reſt of the Price and add them together as before.

EXAMPLES.

3	¼	120 *at* 4*l.* 7*s* 3*d.*½ 87 20 10440 87	21 at 5*l.* 14*s.* 7*d.*¼ *Facit* 120*l.* 6*s.* 8*d.*¼
2	⅙	30 5 1047|5 523*l.* 15*s.*	70 at 1*l.* 14*s.* 7*d.* *Facit* 121*l.* 0*s.* 10*d.*
		14 at 2*l.* 10*s.* 6*d.* *Facit* 35*l.* 7*s.*	46 at 3*l.* 19*s.* 8*d.*½ *Facit* 185*l.* 6*s.* 7*d.*

Q. *What other ways have you of anſwering* Queſtions *in this* Caſe?

A. 1. When the Number of *Integers* does not exceed 12, multiply the Price by the *Integers*, as in *Compound Multiplication*, the Product will be the Anſwer.

2. When the Number of *Integers* does exceed 12, multiply the Price by the Parts inſtead of the Whole. Or,

3. You may multiply the Price by the whole Number of Integers. Thus,

58361 *Hhds. of Tobacco, at* 48l. 12s. 9d. per *Hhd.*

l.	*s.*	*d.*
48	12	9
	58361	
48	12	9
2918	5	0
14591	5	0
389100	0	0
2431875	0	0
2838533	2	9

Memorandum.

1.		2.		3.		4.	
s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
16	6						
18	3	2	6				
2	0						
3	9	17	6	15	0	10	0

Q. *How is it wrought?*

A. Multiply by the ſeveral Figures in the *Multiplier*, as in *Compound Multiplication*, but with this Difference, that the *Products* of the *Shillings* and *Pence*, multiplied by 6, 3, 8, and 5, muſt be placed by themſelves in a *Memorandum*, and the Product of the Pounds by the ſame Figures, placed as in Simple Multiplication. Thus,

	l.	*s*	*d.*	*Memor.*	
	48	12	9		
		58361			
1 Product - -	48	12	9	*s.*	*d.*
2 - - - - -	291			16	6
3 - - - -	145			18	3
4 - - -	389			2	0
5 - -	243			3	9

Then to fill up the *Blanks* in the *ſecond Product*, take half of the 16*s*. in the *Memorandum*, which is 8, and ſet it in the *Units* Place of the Pounds. Annex a Cypher to the 6*d*. which makes 60*d*. or 5*s*. place this under the Shillings, and the Line is done with, there being no Pence remaining.

For the *Blanks* in the *third Product*, take half of the 18*s*. in the *Memorandum*, and put it in the *Tens* Place of the Pounds, Annex a Cypher to the 3*d*. which makes 30*d*. or 2*s*. 6*d*. this put in the *ſecond Memorandum*. Then take half of the 2*s* in this new *Memorandum*, and put in the *Units* Place of the Pounds. Annex a Cypher to the 6*d*. in the new *Me-*

morandum which makes 60*d.* or 5*ſ.* put this in the place of *Shillings*, and this Line is finiſhed, there being no *Pence* remaining.

For the *Blank* in the *fourth Product*, take half of the 2*ſ.* in the firſt *Memorandum*, and put it in the *Hundreds* Place of the Pounds; and becauſe there remains nothing, nor is there any *Pence* in the *Memorandum*, therefore fill up the other *Blanks* with Cyphers, and the Line is finiſhed.

For the *Blanks* in the *fifth Product*, take half of the 3*ſ.* in the firſt *Memorandum*, and put it in the *Thouſands* place of the Pounds; then becauſe there is 1 remaining, put that in the *ſecond Memorandum.* Annex a Cypher to the 9*d.* which makes 90*d.* or 7*ſ.* 6*d*, put this to the former 1, and it makes 17*ſ.* 6*d.* take half of the 17*ſ.* and put it in the *Hundreds* place of the Pounds; then becauſe there is 1 remaining, put that in the *third Memorandum.* Annex a Cypher to the 6*d.* and it makes 60*d.* or 5*ſ.* put this to the 1 in the *third Memorandum* and it makes 15*ſ.* take half of the 15*ſ.* and put it in the *Tens* place of the Pounds; then becauſe there remains 1, put it in the *fourth Memorandum*, and ſince there are no Pence in the *third Memorandum* to put a Cypher to, let a Cypher be annexed to the 1 in the laſt *Memorandum*, which makes 10*ſ.* take half of this 10*ſ.* and put it in the *Units* place of the Pounds; then becauſe there are no *Pence* in the *Memorandum*, neither is there any thing remaining of the 10, therefore fill up the other *Blanks* with *Cyphers*, and the Line is compleated: Add all together, and their *Sum* is the Total *Product* of the Whole.

	l.	*ſ.*	*d.*	
7000 *Hhds of Wine*, at	17	14	8	*per Hhd.*
			7000	
	124133	6	8	

Memorandum.

1.		2.		3.	
ſ.	*d.*	*ſ.*	*d.*	*ſ.*	*d.*
2	8	6	8	6	8

Note 1. *To fill up the* Blanks *in the* Pounds *of the* ſecond, third, &c. Products *always take half of the* Shillings *in the* Memorandum; *and if* 1 *remains, make* a new Memorandum *of it.*

2. *Always annex a* Cypher *to the* Pence, *and whatever Number of* Shillings *they make, put them to the* 1 *in the* new Memorandum, *and ſo on till all the* Blanks *in the* Pounds *are filled up*: *If there be any* Pence *yet remaining in the* Memorandum, *put a* Cypher *to them and what* Shillings *and* Pence *they make, let them be put in the* Shillings *and* Pence *Place of the Product.*

3. *All the* Examples *in this* Caſe, *and in* Caſe 8, *may ſerve there inſtead of others.*

CASE 10.

Q. *What muſt be done with the Price of an* Integer *when both* that *and the* Quantity *given, are of ſeveral Denominations?*

A. Multiply the *Price* by the *Integers*, and take Parts with the Parts of the *Integer*.

EXAMPLES.

C.	qrs.	℔		*l.*	*s.*			*l.*	*s.*	*d.*
12	3	16	*of Tobacco, at*	4	12	*per Cwt.*	*Facit*	59	6	1⅓

		l.	*s.*	*d.*
½	½		12	
		55	4	
¼	½	2	6	
16	$\frac{1}{7}$	1	3	
		0	13	1¾
		59	6	1¾

C.	qrs.	℔		*l.*	*s.*	*d.*			*l.*	*s.*	*a.*
12	2	14	*of Tobacco, at*	3	14	0	*per C.*	*Facit*	46	14	3
17	0	19	*of Sugar, at*	2	2	6	*per C.*	*Facit*	38	1	6¼
4	1	16	*of Soap, at*	3	12	0	*per C.*	*Facit*	15	16	3½
10	0	12	*of Tallow, at*	1	19	6	*per C.*	*Facit*	19	9	2½
5	1	0	*of Tobacco, at*	2	17	0	*per C.*	*Facit*	14	9	3
4	3	0	*of Sugar, at*	2	18	6	*per C.*	*Facit*	13	17	10½
7	0	19	*of Sugar, at*	3	16	0	*per C.*	*Facit*	27	4	11
5	2	10	*of Tobacco, at*	2	18	6½	*per C.*	*Facit*	16	7	2¼
7	1	14	*of Tobacco, at*	3	15	9½	*per C.*	*Facit*	27	18	9½
9	2	26	*of Tallow, at*	4	10	4½	*per C.*	*Facit*	43	19	6

Of INTEREST.

Q. HOW *many kinds of* Intereſt *are there?*

A. Two: *Simple* and *Compound.*

Of SIMPLE INTEREST.

Q. *What is* Simple Intereſt?

A. *Simple Intereſt* is the *Profit* allowed in the lending or forbearance of any Sum of Money for ſome determin'd ſpace of Time.

Q. *What is the* Principal?

A. The *Principal* is any Sum of Money lent, for which *Intereſt* is to be received.

Q. *What is the* Rate per Cent?

A. It is a certain *Sum* agreed on between the *Lender* and the *Borrower*, to be paid for every 100*l.* for the Uſe of the *Principal*, which according to the Laws of *England*, ought not to be above 5*l.* for the Uſe of a 100*l.* for one Year, and 10*l.* for the Uſe of 100*l.* for two Years, and ſo on for any Sum of *Money*, in proportion to the *Time* propoſed.

Q. *What is the* Amount?

A. It is the *Principal* and *Intereſt* added together.

Q. *What other Things is* Intereſt *applicable to?*

A. It is applied to *Commiſſion or Proviſion, Brokage, Storage*, and *Inſurance*, which have no reſpect to *Time*.

CASE 1.

Q. *How do you find the* Intereſt *of any given* Sum *for a* Year?

A. Multiply the *Principal* by the *Rate per Cent* and divide that Product by 100, the Quotient is the *Intereſt* required.

Q. *How do you find the* Intereſt *of any given* Sum *for ſeveral* Years?

A. Multiply the *Intereſt* for one *Year*, by the Number of *Years* given in the Queſtion; the *Product* will be the *Anſwer*.

EXAMPLES.

1. If 100*l.* in one Year's time yield 5*l.* Intereſt, what will 486*l.* yield in the ſame time? *Anſw.* 24*l.* 6*s.*

```
        l
       486
         5
     ------
  24 | 30
     | 20
     | --
   6 | 00
```

2. What is the Intereſt of 220*l* for a Year, at 4 *per Cent per Ann.* *Anſw.* 8*l.* 16.

3. What is the Intereſt of 76*l.* for 2 Years, at 5 *per Cent. per Ann?* *Anſw.* 7*l.* 12*s.*

4. What is the Amount of 400*l.* for 12 Years, at 6 *per Cent. per Ann?* *Anſw.* 688*l*

Of

Of Factors *Allowances, commonly called* Commiſſion *or* Proviſion.

Q. *What is* Commiſſion *or* Proviſion?

A. It is an Allowance from *Merchants* to their *Factors* or *Agents* beyond Sea, in buying or ſelling of any ſort of Goods; and is a certain *Rate per Cent* according to the Cuſtom of the Country where the *Factor* reſides.

EXAMPLES.

5 My Factor ſends me Word, that he has bought Goods to the Value of 500*l.* 13*s.* 6*d* upon my Account; I demand what his Commiſſion comes to, at 3½ *per Cent.* *Anſw.* 17*l.* 10*s.* 5*d.* 2*qrs* $\frac{86}{100}$.

6. My Correſpondent has diſburſed upon my Account, the Sum of 1009*l.* 18*s.* what muſt he demand for his Commiſſion, when I allow him 2¼ *per Cent.* *Anſw.* 22*l.* 14*s.* 5*d.* 1 *qr.* $\frac{84}{100}$.

7. Suppoſe I allow my Correſpondent 1¾ *per Cent.* for Proviſion; what may he demand on the Diſburſement of 704*l.* 15*s.* 4*d*? *Anſw.* 12*l.* 6*s.* 8*d.* $\frac{2}{100}$.

CASE 2.

Q. *How do you find the* Intereſt *of any* Sum *for* ¼, ½, *or* ¾ *of a* Year, *beſide the Number of* Years *given in the* Queſtion?

A. For ¼ of a Year, take a *fourth Part* of the *Intereſt* for one Year; for ½ a Year, take *half* of the *Intereſt* for one Year; for ¾ of a Year, take the Parts compounded of ¾, and add them to the *Intereſt* for the reſt of the Time; the *Sum* will be the *Intereſt* required.

EXAMPLES.

1. What is the Intereſt of 200*l.* for 3 Years and ¾, at 5 *per Cent. per Annum*? *Anſw.* 37*l.* 10*s.*

```
  200              | ½ | ½ | 10
    5              |   | . |  3
 ----              |   |   | --
 10 | 00           |   |   | 30
                   | ¼ | ½ |  5
                   |   |   |  2  10
                             ------
                             37  10
```

2. What is the Intereſt of 468*l.* 12*s.* 4*d.* for 1 Year and ¾, at 6 *per Cent. per Annum?* *Anſw.* 49*l.* 4*s.* 1*d.*

3. What is the Intereſt of 112*l.* 10*s.* 4*d.* for 5 Years and ½, at 6 *per Cent. per Annum?* *Anſw.* 37*l.* 2*s.* 6*d.*

4. What is the Intereſt of 468*l.* for 4 Years and ¼, at 6 *per Cent. per Annum?* *Anſw,* 119*l.* 6*s.* 8*d.* ¾.

5. What is the Intereſt of 1000*l.* for 2 Yeais ¾, at 4 *per Cent. per Annum?* *Anſw.* 110*l.*

Of BROKAGE.

Q. *What is* Brokage?

A. It is an Allowance made to Perſons called *Brokers,* at a certain *Rate per cent.* for finding Cuſtomers, and ſelling to them the Goods of other Men, whether Strangers or Natives.

Q. *How do you find the* Brokage *of any Sum?*

A. Divide the given Sum by 100, and take Parts from the Quotient with the *Rate per cent.*

EXAMPLES.

6. What is the Brokage of 700*l.* 14*s.* 6*d.* at 4*s.* *per cent.* *Anſw.* 1*l.* 8*s.* 0*d.*½.

```
7 | 00 14 6        | 4 | ⅕ | 7  0  1½
  | 20                     ----------
  | —                      1  8  0½
0 | 14
  | 12
  | —
1 | 74
  |  4
  | —
2 | 96
```

7. What may a Broker demand for Brokage, when he ſells Goods to the Value of 500*l.* 10*s.* 7*d.* and I allow him 7*s.* *per cent?* *Anſw.* 1*l.* 15*s.* 0*d.* ¼.

8 Suppoſe I employ a Broker, who ſells Goods to the Value of 909*l.* 14*s.* 10*d.* what is the Brokage at 6*s.* 6*d.* *per Cent?* *Anſw.* 2*l.* 19*s.* 1*d.*½.

Note, *If the* Brokage *ſhould be* 1l. *or more* per cent. *the Operation will be the ſame with that in* Factors Allowances.

Caſe

CASE. 3.

Q. *How is the* Intereſt *of any Sum found, when the* Rate per cent. is $\frac{1}{4}$, $\frac{1}{2}$, *or* $\frac{3}{4}$, *more than the Pounds given in the ſaid* Rate?

A. Multiply the *Principal* by the *Pounds*, in the *Rate per cent.* as before, and let the *Parts* for $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$, be taken from the *Principal* and added to that *Product*; then proceed according to *Caſe* 1 or 2.

EXAMPLES.

1. What is the Intereſt of 400l. for 2 Years, at $5\frac{1}{4}$ *per cent per annum?* *Anſw.* 44*l.*

2. What is the Intereſt of 120*l.* for a Year, at $4\frac{1}{2}$ *per cent. per annum?* *Anſw.* 5*l.* 8*s.*

3. What is the Amount of 690*l.* for 3 Years, at $4\frac{1}{4}$ *per cent. per Annum?* *Anſw.* 777*l.* 19*s.* 6*d.*

4. What is the Amount of 120*l.* 10*s.* for 2 Years and an half at $4\frac{3}{4}$ *per cent. per annum?* *Anſw.* 134*l.* 16*s.* 1*d.*$\frac{3}{4}$

5. What is the Intereſt of 300*l.* for 5 Years and 3 Quarters, at $3\frac{3}{4}$ *per cent. per annum?* *Anſw.* 64*l.* 13*s.* 9*d.*

CASE 4.

Q. *How do you find the* Intereſt *of any Sum for a certain Number of* Weeks?

A. As 52 Weeks?
Are to the Intereſt of the given Sum for a Year;
So are the Weeks given,
To the Intereſt required.

EXAMPLES.

1. What is the Intereſt of 400*l.* for a Week, at 5 *per Cent. per annum?* *Anſw.* 7*s.* 8*d.* 1*qr.* $\frac{12}{52}$

2. What is the Intereſt of 126*l.* 12*s.* for 16 Weeks, at $4\frac{1}{2}$ *per cent. per annum?* *Anſw.* 1*l.* 15*s.* 0*d.* 2*qrs.* $\frac{40}{52}$

3. What is the Amount of 500*l.* for 20 Weeks, at $3\frac{1}{2}$ *per per cent. per annum?* *Anſw.* 506*l.* 14*s.* 7*d.* 1*qr.* $\frac{23}{52}$.

CASE 5.

Q. *How is the* Principal *found, when the* Amount, Time, *and* Rate per cent. *are given?*

A. As the *Amount* of 100*l.* at the *Rate* and *Time* given
Is to 100*l.*
So is the *Amount* given.
To the *Principal* required.

EXAMPLES.

1. What Principal being put to Intereſt for 9 Years, at 5 *per cent. per annum*, will amount to 725*l*? *Anſw.* 500*l*.

2. What Principal being put to Intereſt for 7 Years, will amount to 793*l*. 12*s*. at 4 *per cent. per annum*? *Anſw.* 620*l*.

3. What Sum being put to Intereſt will amount to 520*l*. 16*s*. in 8 Years, at 3 *per cent. per annum*? *Anſw.* 420*l*.

CASE 6.

Q. *How is the* Rate per cent. *found, when the* Amount, Time, *and* Principal *are given?*

A. 1. As the *Principal*
Is to the *Intereſt* for the whole *Time*;
So is 100*l*.
To its *Intereſt* for the ſame *Time*.

2. Divide the *Intereſt*, laſt found, by the *Time*, and the Quotient will be the *Rate per cent.*

EXAMPLES.

1. At what Rate of Intereſt *per cent.* will 500*l*. to amount to 725*l*. in 9 Years Time? *Anſw.* 5 *per cent.*

2. At what Rate of Intereſt *per cent.* will 620*l*. amount to 793*l*. 12*s*. in 7 Years? *Anſw.* 4 *per cent.*

3. At what Rate of Intereſt *per cent.* will 420*l*. amount to 520*l*. 16*s*. in 8 Years? *Anſw.* 3 *per cent.*

CASE 7.

Q. *How is the* Time *found, when the* Principal, Amount, *and* Rate per cent. *are given?*

A. As the *Intereſt* of the *Principal* for 1 Year at the given Rate
Is to one Year;
So is the whole *Intereſt*
To the *Time* required.

EXAMPLES.

1. In what Time will 500*l* amount to 725*l*. at 5 *per cent. per annum*? *Anſw.* 9 *Years.*

2. In what Time will 620*l* amount to 793*l*. 12*s*. at 4 *per cent. per annum*? *Anſw.* 7 *Years.*

3. In what Time will 420*l*. amount to 520*l*. 16*s*. at 3 *per cent. per annum*? *Anſw.* 8 *Years.*

Q. *How are the* Queſtions *in the foregoing* Caſes *proved?*

A. *Caſes* 1, 5, 6 and 7 do exactly prove each other, by varying the *Queſtions*: yet all of them except *Caſe* 5, and the 1ſt, 2d, 5th, 6th, and 7th *Queſtions* in *Caſe* 1, and the 6th, 7th and 8th in *Caſe* 2, may as truly be anſwered by the *Double Rule of Three*; of which more hereafter.

Note 1. *The 1ſt, 2d, 5th, 6th, 7th* Queſtions *in* Caſe 1, *and the 6th, 7th and 8th in* Caſe 2, *are to be proved by the* Single Rule of Three.

2 Caſe 5, *cannot be anſwered by the* Double Rule of Three *becauſe the* Principal *is not known in the* Queſtion, *and therefore there can be no Deduction of it from the* Amount, *to know the* Intereſt, *which muſt firſt be done.*

Of SIMPLE INTEREST *for Days*

Q. *How do you find the Intereſt of any Number of Days?*

A. Multiply the *Pence* of the *Principal* by the *Days*, and by the *Rate* of *Intereſt* for a *Dividend*, and 365 by 100 for a *Diviſor*, the *Quotient* will be the Anſwer in *Pence*.

Q. *How are the following* Queſtions *proved?*

H. As 365 *Days*
Are to the *Intereſt* of the given *Sum* for a Year;
So is the *Time* propoſed
To the *Intereſt* required.

EXAMPLES.

1. What is the Intereſt of 120*l.* for 126 Days, at 4 *per cent. per annum?* *Anſw.* 1*l.* 13*s.* 1*d.* 1*qr.* $\frac{258}{365}$.

2. What is the Intereſt of 126*l.* for 145 Days, at 6 *per cent. per annum?* *Anſw.* 3*l.* 0*s.* 0*d.* 3*qrs.* $\frac{57}{365}$

3. What is the Intereſt of 100*l.* from *June* 1, 1739, to *March* 9, 1740, which was Leap Year, at 5 *per cent. per annum?* *Anſw.* 3*l.* 17*s.* 6*d.* 1*qr* $\frac{228}{365}$.

4. What is the Intereſt of 200*l* from *Auguſt* 14 to *December* 19 following, at 6 *per cent. per annum?* *Anſw.* 4*l.* 4*s* 1*d.* 3*qrs.* $\frac{125}{365}$

5. What is the Intereſt of 10*l.* for 25 Days, at 5 *per cent. per Annum?* *Anſw.* 8*d.* $\frac{80}{365}$

6. What is the Intereſt of 40*l.* for 40 Days, at 4 *per cent. per nanum?* *Anſw.* 3*s.* 6*d.* $\frac{10}{365}$

See more of Simple Intereſt in *Decimals.*

Of COMPOUND INTEREST.

Q. *What is* Compound Intereſt?

A. *Compound Intereſt* is that which ariſes from any *Principal* and its *Intereſt* put together, as the *Intereſt* ſtill becomes due; and for that Reaſon it is called *Intereſt upon Intereſt,* or *Compound Intereſt.*

Q. *Is it lawful to let out* Money *at* Compound Intereſt?

A. No: Yet in purchaſing of *Annuities,* or *Penſions,* and *Leaſes* in *Reverſion,* it is very uſual to allow *Compound Intereſt* to the Purchaſer for his *Ready Money*; and therefore it is very neceſſary to underſtand it. [*See more of this in* Decimals]

Q. *How do you find the* Compound Intereſt *of any given* Sum *for any Number of Years?*

A. 1. Find the *Amount* of the given Sum by *Simple Intereſt,* for the firſt Year, which is the *Principal* for the ſecond Year, then find the *Amount* of that *Principal* for the ſecond Year, and that is the *Principal* for the third Year; and ſo on for any Number of Years given.

2. Subtract the given Sum from the laſt *Amount,* and the Remainder is the *Compound Intereſt* required.

EXAMPLES.

1. What Sum will 450*l.* amount to in 3 Years, at 5 *per cent. per annum, Compound Intereſt?* *Anſw.* 520*l.* 18*s.* 7*d.*$\frac{1}{2}$

2. What will 400*l.* amount to in 4 Years, at 6 *per cent. per annum, Compound Intereſt?* *Anſw.* 504*l.* 19*s.* 10*d.*$\frac{1}{4}$.

3. What will 480*l.* amount to in 6 Years, at 5 *per cent per annum, Compound Intereſt?* *Anſw.* 643*l.* 4*s.* 10*d.*$\frac{1}{2}$

4. What will 500*l.* amount to in 4 Years, at 4$\frac{3}{4}$ *per cent. per ann. Compound Intereſt?* *Anſw.* 590*l.* 10*s.* 3*d.*$\frac{1}{2}$

5. What is the *Compound Intereſt* of 400*l.* 10*s.* at 3$\frac{1}{2}$ *per cent. per annum,* for 3 Years? *Anſw.* 43*l.* 10*s.* 8*d.* $\frac{3}{4}$

Of REBATE *or* DISCOUNT.

WHAT *is* Rebate *or* Diſcount?

A. *Rebate* or *Diſcount* is when a Sum of Money due at any Time to come, is ſatisfied by paying ſo much preſent Money, as being put out to *Intereſt* would amount to the given *Sum* in the ſame ſpace of *Time.*

Q. *How is the* Operation *performed?*

A. 1. As 12 Months
Are to the *Rate per Cent.*
So is the *Time* propoſed
To a *fourth Number.*

2. Add that *fourth Number* to 100*l.*

3. As that *Sum*
Is to the *fourth Number*:
So is the given *Sum*
To the *Rebate.*

4. Subtract the *Rebate* from the given *Sum,* and the *Remainder* is the *preſent Worth.* Or thus,

3. As that *Sum*
Is to 100*l.*
So is the given *Sum*
To the *preſent Payment.*

4. Subtract the *preſent Worth* from the given *Sum,* and the *Remainder* is the *Rebate.*

Q. *How to you prove* Queſtions *in* Rebate?

A. Find the *Amount* of the *preſent Payment* at the *Time* and *Rate per Cent.* given, and *that* will be equal to the given Sum.

EXAMPLES.

1. What is the Rebate of 795*l.* 11*s.* 2*d.* for 11 Months, at 6 *per Cent?* *Anſw.* 41*l.* 9*s.* 5*d.* 3*qrs.* $\frac{1572}{2532}$.

2. What is the preſent Worth of 161*l.* 10*s.* for 19 Months, at 5 *per Cent?* *Anſw.* 149*l.* 13*s.* 0*d.* $\frac{3}{4}$

3. Sold Goods for 795*l.* 11*s.* 2*d.* to be paid 4 Months hence, what is the preſent Worth, at 3$\frac{1}{2}$ *per Cent?* *Anſw.* 786*l.* 7*s.* 8*d.* $\frac{1}{4}$

4. What is the preſent Worth of 4000*l.* payable in 9 Months, at 4$\frac{3}{4}$ *per Cent?* *Anſw.* 3862*l.* 8*s.* 0*d.* $\frac{1}{2}$

5. How much Ready Money for a Note of 18*l.* due 15 Months hence at 5 *per Cent?* *Anſw* 16*l.* 18*s.* 10*d.*

6. Suppoſe 810*l.* were to be paid 3 Months hence, allowing 5 *per Cent* Diſcount, what muſt be paid in Hand? *Anſw.* 800*l.*

7. If a Legacy of 1000*l.* is left me *July* 24, 1742, to be paid on the *Chriſtmas day* following, what muſt I receive, when I allow 6 *per Cent.* for preſent Payment? *Anſw.* 975*l.* 3*s.* 1*d.*

8. Being obliged by a Bond, bearing Date *Auguſt* 29, 1742, to pay next *Midſummer* 326*l.* what muſt I pay down, if they allow Diſcount after the Rate of 8 *per Cent?* *Anſw.* 305*l.* 16*s.* 6*d.* $\frac{1}{4}$.

9. Sold Goods for 312*l.* to be paid at two 3 Months, (that is, half at 3 Months, and the other half at 3 Months after that) what muſt be diſcounted for preſent Payment at 5 *per Cent?* *Anſw.* 5*l.* 14*s.* 7*d.*

10. Sold Goods for 300*l.* to be paid at three 2 Months, (that is, one third at 2 Months, one third at 4 Months, and one third at 6 Months) what muſt be diſcounted for preſent Payment, at 4 *per Cent?* *Anſw.* 3*l.* 18*s.* 9*d.*

11. What is the preſent Worth of 100*l.* at 5 *per Cent.* payable at two 4 Months? *Anſw.* 97*l.* 11*s.* 4*d.* $\frac{1}{2}$

12. I would know the preſent Worth of 150*l.* payable at three 4 Months, at 5 *per Cent.* Diſcount? *Anſ.* 145*l.* 3*s.* 9*d.*$\frac{1}{4}$

13. What is the preſent Worth of 200*l.* at 4 *per Cent.* payable as follows, *viz.* 100*l.* at 2 Months, 50*l.* at 3 Months, and 50*l.* at 5 Months? *Anſw.* 198*l.* 0*s.* 6*d.*

Of EQUATION *of* PAYMENTS.

The common Way.

Q. W*HAT is* Equation *of* Payments?

A. When ſeveral Sums of Money, to be paid at different Times, are reduced to one mean Time for the Payments of the Whole, without Loſs to *Debtor* or *Creditor*; this is called *Equation* of *Payments.*

Q. *Wherein may the* Debtor *or* Creditor *be ſaid to ſuffer Loſs, when the Debt is paid?*

A. 1. When one *mean Time* is aſſigned for the Payment of the whole Debt, and the Money is not paid till ſome Time afterwards, then the *Debtor* ſuffers Loſs by paying not only the *Principal,* or Sum due, but alſo the *Intereſt* of that Sum for the Time of Forbearance, at 3, 4, or more *per Cent,* as they ſhall agree. Likewiſe if the Money be paid before it is due, then the *Creditor* ſuffers Loſs by allowing ſo much *per Cent.* by Agreement, for the Time of prompt Payment.

2. The Loſs to either Party, may be in reducing the ſeveral Times of payment to one, which is not the true equated *Time*; and then if the *Payment* be made after the true Time, the *Creditor* ſuffers Loſs, becauſe he receives no *Intereſt* for it; if the Time agreed on be before the true Time, then the *Debtor* ſuffers Loſs, becauſe he receives no *Intereſt* for his early Payment.

Q. *How is the Operation wrought?*

A. Multiply each Payment by its Time, and divide the Sum of all the Products by the whole Debt, and the Quotient is the *equated Time.*

EXAMPLES.

1. *A* owes *B* 100*l.* whereof 50*l.* is to be paid at 2 Months, and 50*l.* at 4 Months; but they agreed to reduce them to one Payment; when muſt the Whole be paid? *Anſw.* 3 *Months.*

2. A Merchant hath owing him 300*l.* to be paid as follows; 50*l.* at 2 Months, 100*l.* at 5 Months, and the reſt at 8 Months; and it is agreed to make one Payment of the Whole. I demand when that Time muſt be? *Anſw.* 6 *Months.*

3. *F.* owes to *H.* 1000*l.* whereof 120*l.* is to be paid preſent, 400*l.* at 5 Months, and the reſt at 10 Months, but they agree to make one Payment of the Whole, I demand the equated Time? *Anſw.* 6 *Months.*

4. *K* is indebted to *L* a certain Sum, which is to be diſcharged at 4 ſeveral Payments, that is $\frac{1}{4}$ at 1 Month, $\frac{1}{4}$ at 4 Months, $\frac{1}{4}$ at 6 Months, and $\frac{1}{4}$ at 8 Months; but they agreeing to make but one Payment of the Whole, the equated Time is therefore demanded? *Anſw.* 5 *Months.*

5. *H* bought of *X* a Quantity of Goods upon Truſt, for which *H* was to pay $\frac{1}{3}$ of the Debt every 3 Months, till the Whole was diſcharged; but they afterwards agreed to pay the Whole at one equated Time; the Time is demanded? *Anſw* 6 *Months.*

6. *W* owes *Z* a Sum of Money, which is to be paid, $\frac{1}{2}$ preſent, $\frac{1}{4}$ at 4 Months, and the reſt at 8 Months, what is the equated Time for the Whole? *Anſw.* 3 *Months.*

7. *P* owes *Q* 420*l.* which will be due 6 Months hence; but *P* is willing to pay him 60*l.* now, provided he can have the reſt forborn a longer Time: It is agreed on; the Time of Forbearance therefore is required? *Anſw.* 7 *Months.*

Note, *This* Queſtion *is in* Reverſe Proportion.—*See more of this* Rule *in* Decimals.

Of BARTER.

Q. WHAT *is* Barter?

A. *Barter* is the Exchanging of one *Commodity* for another, and informs Merchants ſo to proportion their *Quantities*, as that neither may ſuſtain *Loſs*.

Q. *How do you prove Queſtions in* Barter?

A. By changing the Order of them.

EXAMPLES.

1. How much Sugar, at 9*d. per* ℔ muſt be given in Barter for 6 *C.* $\frac{1}{2}$ of Tobacco, at 14*d. per* ℔? *Anſw.* 10 *C.* 0 *qrs.* 12℔ $\frac{4}{9}$.

2. What Quantity of Tea, at 10*s. per* ℔ muſt be given in Barter for 1 *C.* of Chocolate, at 4*s. per* ℔? *Anſw.* 44℔ 12*oz.* $\frac{8}{10}$

3. How much Rice at 28*s. per Cwt.* muſt be bartered for 3 *C.* $\frac{1}{2}$ of Raiſins, at 5*d. per* ℔? *Anſw.* 5*C.* 3*qrs.* 9℔. $\frac{1}{3}\frac{1}{3}\frac{2}{8}$

4. *A* and *B* bartered: *A* had 5 *C.* of Sugar, at 6*d. per* ℔, which he gave to *B* for a Quantity of Cinnamon at 10*s.* 8*d. per* ℔; I demand how much Cinnamon *B* gave *A*? *Anſw.* 26 ℔ 4 *oz.*

5. *B* delivered 3 Hhds. of Brandy, at 6*s.* 8*d. per* Gallon, to *C* for 126 Yards of Cloth; what was the Cloth *per* Yard? *Anſw.* 10*s*

6. *A* and *B* bartered: *A* had 12 *C.* of Sugar, worth 4*d. per* ℔, for which *B* gave him 1 *C.* $\frac{3}{4}$ of Cinnamon; I demand how *B* rated his Cinnamon *per* ℔? *Anſw.* 27*d.* $\frac{84}{196}$

7. *A* hath Linnen Cloth worth 20*d.* an Ell ready Money; but in Barter he will have 2*s.* *B* hath Broad Cloth worth 14*s.* 6*d. per* Yard ready Money; at what Price ought the Broad Cloth to be rated in Barter? *Anſw.* 17*s.* 4*d* 3*qrs.* $\frac{2}{10}$ *per* Yard.

8 *A* and *B* barter: *A* hath 41 *Cwt.* of Hops at 30*s. per C.* for which *B* giveth him 20*l* in Money, and the reſt in Prunes at 5*d. per* lb; I demand how much Prunes *B* gave *A* beſides the 20*l*? *Anſw.* 17 *C.* 3*qrs.* 4 ℔.

9. *C* hath Candles, at 6*s. per* Dozen ready Money; but in Barter he will have 6*s.* 6*d. per* Dozen; *D* hath Cotton, at 9*d. per* ℔ ready Money; I demand what Price the Cotton muſt be at in Barter; alſo how much Cotton muſt be bartered for 100 Dozen of Candles? *Anſw. The Cotton is* 9d. 3qrs. per ℔ *in Barter*; *and* 7 C. 0qr. 16℔ *of Cotton muſt be given for* 100 *Dozen of Candles.*

Of LOSS *and* GAIN.

Q. WHAT *is* Loſs *and* Gain?

A. *Loſs* and *Gain* is a Rule which teaches *Merchants* what they ſhall *gain* or *loſe* in the Sale of their Goods, having the *Price* that they bought them for, and the *Price* for which they are to be ſold both known.

Q. *How are the following* Queſtions *proved?*

A. Let them be varied.

Examples

EXAMPLES.

1. Bought 18 *C.* of Cheeſe, at 28*s. per C.* which I ſell out again at 3*d.* $\frac{1}{2}$ *per* ℔; what is the Profit in the Whole? *Anſ.* 4*l.* 4*s.*

2. If I buy Deals in at 20*d.* a-piece, and ſell them again at 17*d.* what ſhall I loſe by 120 Dozen? *Anſw.* 18*l.*

3. Hats bought at 4*s.* a piece, and ſold again at 4*s.* 9*d.* what is the profit in laying out 100*l.* *Anſw.* 18*l.* 15*s.*

4. Bought 19 Fother of Lead, each 19 *C.* 2*qrs.* at 14*s. per C.* what is gained by the whole Quantity ſold out again at 4*d. per* ℔? *Anſw.* 432*l.* 5*s.*

5. Bought 60 Rheams of Paper, at 15*s. per* Rheam, what is the Loſs in the whole Quantity, at 4 *per Cent?* *Anſw.* 1*l.* 16*s.*

6. Bought 7 Tuns of Wine, at 17*l. per Hhd.* which I ſell again at 1*s. per* Pint; I demand the whole Gain, and the Gain *per Cent?* *Anſw.* 129*l.* 1*s. whole Gain, and* 48*l.* 4*s.* 8*d.* 1 *qr.* $\frac{420}{478}$ *the Gain* per Cent.

7. If I ſell 500 Deals at 15*d.* a piece, and 9*l. per Cent.* Loſs; what do I loſe in the whole Quantity? *Anſw.* 2*l.* 16*s.* 3*d.*

8. Bought 3 Oxen for 24*l.* 10*s.* which I ſell again for 2*s. per* Stone, what ought the three Oxen weigh together; the Hides and Offal being the only clear Gain? *Anſw.* 245 *Stone.*

9. A Draper bought 100 Yards of Broad Cloth, for which he gave 56*l.* I deſire to know how he muſt ſell it *per* Yard to gain 19*l.* in the Whole? *Anſw.* 15*s per Yard.*

10. A Draper bought 100 Yards of Broad Cloth for 56*l.* I demand how he muſt ſell it *per* Yard to gain 15*l.* in laying out 100*l?* *Anſw.* 12*s.* 10*d.* 2 *qrs.* $\frac{24}{100}$.

Of FELLOWSHIP.

Q. HOW *many Sorts of* Fellowſhip *are there?*

A. Two, *Single* and *Compound.*

Of SINGLE FELLOWSHIP.

Q. *What is* Single Fellowſhip?

A. *Single Fellowſhip* is when the Stocks of each Partner continue for an equal Term of Time.

Q. *What is the* Rule?

As the *Sum* of the ſeveral *Stocks*
Is to the *Total Gain* or *Loſs:*
So is each Man's *Share* in *Stock*
To his *Share* of the *Gain* or *Loſs.*

Q. *How is this* Rule *proved?*

A. Add all the *Shares* together, and the *Sum* will be equal to the given *Gain* or *Loſs.*

Note, *This way of proving* Fellowſhip, *will not hold good always: For if an* Error *ſhould be committed in the Beginning of the Work, and carried on thro' the whole Operation, yet the ſame will prove, tho' each Man's* Share *of the* Gain or Loſs *aſſigned him by that Operation, be either more or leſs than his true* Share. *The moſt exact Method, then, that I would propoſe, tho' ſomething more tedious, is to change the Order of the Queſtion, and put each Man's* Share *of the* Gain *or* Loſs *in the Place of his* Stock *firſt laid out, and make the* Sum *of the* Stocks *ſtand in the Place of the* whole Gain *or* Loſs; *and then it will be*

As the *Total Gain* or *Loſs*
Is to the *Sum* of the ſeveral *Stocks*:
So is each Man's *Share* of the *Gain* or *Loſs*
To his particular *Share* in *Stock*

Q. *What elſe doth this Rule belong to beſide* Fellowſhip?

A. By it the Eſtate of a Bankrupt may be divided among his Creditors: Alſo Legacies may be adjuſted, when there is a Deficiency of the Effects

EXAMPLES.

1. *A* and *B* where Sharers in a Parcel of Merchandize, in the Purchaſe of which, *A* laid out 3*l.* and *B* 7*l.* and the Commodity being ſold they find their clear Gain amount to 25*s.* what Part of it muſt each Man have? *Anſw. A muſt have 7s. 6d.* and *B 17s. 6d.*

2. *A, B,* and *C,* trading together, gain'd 120*l.* which is to be ſhared according to each Man's Stock; *A* put in 140*l.* *B* 300*l.* and *C* 160*l.* what is each Man's Share? *Anſw. A* 28*l.* *B* 60*l.* *C* 32*l.*

3. Three Merchants trading to *Virginia,* loſt Goods to the Value of 800*l.* Now if *A*'s Stock was 1200*l.* *B*'s 4800*l.* and *C*'s 2000*l.* what Sum did each loſe? *Anſw. A loſt* 120*l.* *B* 480*l.* *C* 200*l.*

4. Three Merchants traded together, and they put into one commonStock 1000*l* each Man, and gained 600*l.* how much muſt each Man have? *Anſw.* 200*l. each Man.*

5. Four Men traded with a Stock of 800*l.* and they gain'd in two Years Time, twice as much and 40*l.* over; *A*'s Stock was 140*l.* *B*'s 260*l.* *C*'s 300*l.* I demand *D*'s Stock, and what each Man gain'd by Trading? *Anſw.* D's Stock was 100*l.* and *A* gained 287*l.* *B* 533*l.* *C* 615*l.* and *D* 205*l.*

6. *A, B,*

6. *A*, *B* and *C*, trading to *Guinea* with 480*l.* 680*l.* and 840*l.* in three Years Time did gain 1010*l.* how much is each Man's Share of the Gain? *Anſw.* *A* 242*l* 8*s.* *B* 343*l.* 8*s.* *C* 424*l.* 4*s.*

7. *A*, *B*, and *C*, freighted a Ship from the *Canaries* to *England* with 108 Tuns of Wine, of which *A* had 48, *B* 36, *C* 24, but by reaſon of bad Weather they were obliged to caſt 45 Tuns overboard; how much muſt each Man ſuſtain of the Loſs? *Anſw.* *A* 20 *Tuns*, *B* 15 *Tuns*, *C* 10 *Tuns.*

8. A Merchant is indebted to *S* 70*l.* to *T* 400*l* to *V* 140*l.* 12*s.* 6*d.* but upon his Deceaſe, his Eſtate is found to be worth no more than 409*l.* 14*s.* how muſt it be divided among his Creditors? *Anſ.* *S muſt have* 46*l.* 19*s.* 3*d.* 3*qrs* $\frac{141750}{146550}$.
T ——— 268 7 7 1 $\frac{77250}{146550}$.
V ——— 94 7 0 2 $\frac{74100}{146550}$.

9. If the Money and Effects of a Bankrupt amount to 1400*l.* 14*s.* 6*d.* and he is indebted to *A* 742*l*, 12*s* to *B* 641*l.* 19*s.* 8*d.* and to *C* 987*l.* 19*s.* 9*d.* how muſt it be divided among them? *Anſw.* *A muſt have* 438*l.* 8*s.* 4*d* 1*qr.* $\frac{303527}{569417}$.
B ——— 379 0 3 3 $\frac{158361}{569417}$.
C ——— 583 5 9 3 $\frac{107529}{569417}$.

Of *COMPOUND FELLOWSHIP.*

Q. *What is* Compound Fellowſhip?

A. *Compound Fellowſhip* is when the *Stocks* continue an unequal Term of Time.

Q. *What is the* Rule?

A. 1. Multiply each Man's *Stock* and *Time* together.
2. Add the ſeveral *Products*, thence ariſing, together
3. As the *Sum* of theſe *Products*
Is to the whole *Gain* or *Loſs*;
So is each *Product*
To its *Share* of the *Gain* or *Loſs.*

Q. *How is this* Rule *proved?*

A. As in *Single Fellowſhip.*

EXAMPLES.

1. Three Merchants traded together: *A* put in 120*l.* for 9 Months, *B* 100*l.* for 16 Months, and *C* 100*l.* for 14 Months; and they gained 100*l.* how muſt it be divided?
Anſw. *A muſt have* 26*l.* 9*s.* 4*d.* 3*qrs* $\frac{3120}{4080}$.
B ——— 39 4 3 3 $\frac{240}{4080}$.
C ——— 34 6 3 1 $\frac{720}{4080}$.

2. Three Merchants join in Trade: *A* put in 400*l.* for 9 Months, *B* 680*l.* for 5 Months, *C* 120*l.* for 12 Months; but by Misfortune loſt Goods to the Value of 500*l.* what muſt each Man ſuſtain of the Loſs? *Anſw.*

A muſt loſe 213*l.* 5*s.* 4*d.* 3*qrs* $\frac{2840}{8440}$.
B ——— 201 8 5 0 $\frac{7840}{8440}$.
C ——— 85 6 1 3 $\frac{6200}{8440}$.

3. *A, B* and *C* hold a Paſture in common, for which they pay 20*l.* *per annum.* In this Paſture *A* had 40 Oxen for 76 Days, *B* had 36 Oxen for 50 Days, and *C* had 50 Oxen for 90 Days; I demand what Part every of theſe Tenants ought to pay of the 20*l.* *Anſw.* *A ought to pay* 6*l.* 10*s.* 2*d.* 1*qr.* $\frac{2344}{9340}$.
B ——— 3 17 1 0 $\frac{2000}{9340}$.
C ——— 9 12 8 2 $\frac{5000}{9340}$.

Of the Double Rule *of* THREE.

Q. BY *what is the* Double Rule *of* Three *known?*

A. By five Terms, which are always given in the Queſtion to find a ſixth.

Q. *In what Proportion is the* ſixth Term *to be found?*

A. If the Proportion is *direct*, the *ſixth Term* muſt bear ſuch Proportion to the *fourth* and *fifth*, as the *third* bears to the *firſt* and *ſecond*. But if the Proportion is *inverſe*, then the *ſixth Term* muſt bear ſuch Proportion to the *fourth* and *fifth*, as the *firſt* bears to the *ſecond* and *third*, or as the *ſecond* bears to the *firſt* and *third*.

Note, *It is to be obſerved here, as in the* Single Rule *of* Three, *that* Direct Proportion *is when* more requires more, *or* leſs requires leſs; *and* Inverſe Proportion *is when* more requires leſs, *or* leſs requires more.

Q. *What do you obſerve concerning the* five *given* Terms?

A. That the *three firſt* Terms are a Suppoſition; the *two laſt* are a Demand.

Q. *How muſt the Numbers given in the* Queſtion *be ſtated?*

A. By two *Single Rules* of *Three*: Or otherwiſe, thus,

1. Let the principal Cauſe of *Loſs* or *Gain*, *Intereſt* or *Decreaſe*, *Action* or *Paſſion*, be put in the *firſt Place.*

2. Let that which betokeneth *Time*, *Diſtance of Place*, and the like, be put in the *ſecond Place*, and the remaining one in the *third Place.*

3. Place the other *two Terms* under their like in the Suppoſition.

4. If the *Blank* falls under the *third Term,* multiply the *firſt* and *ſecond Terms* for a *Diviſor,* and the other *three* for a *Dividend.*

5. If the *Blank* falls under the *firſt* or *ſecond Term,* multiply the *third* and *fourth Terms* for a *Diviſor,* and the other *three* for a *Dividend,* and the *Quotient* will be the Anſwer.

Note, *When the* Blank *falls under the* third Term, *the Proportion is* Direct; *but when it falls under the* firſt *or* ſecond Term, *the Proportion is* Inverſe.

Q. *How are the following Queſtions proved?*

A. Let them be varied, or elſe work the ſame Queſtions by two *Single Rules* of *Three.*

EXAMPLES.

1. If 7 Men can reap 84 Acres of Wheat in 12 Days; how many Men can reap 100 Acres in 5 Days? *Anſw.* 20 *Men.*

2. If 7 *Qrs.* of Malt are ſufficient for a Family of 7 Perſons for 4 Months; how many *Qrs.* are enough for 46 Perſons 10 Months? *Anſw.* 115 *Qrs.*

3. If 8 Reapers have 3*l.* 4*s.* for 4 Days Work; how much will 48 Men have for 16 Days Work? *Anſw.* 76*l.* 16*s.*

4. If 10 Buſhels of Oats be enough for 18 Horſes 20 Days: how many Buſhels will ſerve 60 Horſes 36 Days? *Anſ.* 60 *Buſh.*

5. If a Footman travel 240 Miles in 12 Days, when the Days are 12 Hours long; how many Days may he travel 720 Miles in, of 16 Hours long? *Anſw* 27 *Days.*

6. If 56 ℔ of Bread will be ſufficient for 7 Men 14 Days; how much Bread will ſerve 21 Men 3 Days? *Anſw.* 36 ℔.

7. If 700*l.* in half a Year raiſe 14*l.* Intereſt; how much will 400*l.* raiſe in 5 Years? *Anſw.* 80*l.*

8. If 30*s.* be the Hire of 8 Men for 3 Days how many Days muſt 20 Men work for 15*l ?* *Anſw.* 12 *Days.*

9. If 4 Reapers have 24*s.* for 3 Days Work, how many Men will earn 4*l.* 16*s* in 16 Days? *Anſw.* 3 *Men.*

10. An Uſurer put out 86*l.* to receive Intereſt for the ſame; and when it had continued 8 Months, he received for Principal and Intereſt 88*l.* 17*s.* 4*d.* I demand at what Rate *per Cent. per annum* he received Intereſt? *Anſw.* 5*l. per Cent.*

11. What is the Intereſt of 200*l.* for 3 Years and $\frac{3}{4}$, at 5 *per Cent. per Annum?* *Anſw.* 37*l.* 10*s.*

12. What is the Intereſt of 400*l.* for a Week, at 5 *per Cent. per annum?* *Anſw.* 7*s.* 8*d.* 1 *qr.* $\frac{12}{52}$.

Of

Of *CONJOIN'D PROPORTION.*

Q. *What is* Conjoin'd Proportion ?

A. *Conjoin'd Proportion* is when the *Coins*, *Weights* or *Meaſures* of ſeveral Countries are compared in the ſame Queſtion; or it is a linking together of many *Proportions.*

CASE 1.

Q. *When it is required to know how many of the* firſt *ſort of* Coin, Weight *or* Meaſure, *mentioned in the* Queſtion, *are equal to a given Number of the* laſt ; *how muſt the* Queſtion *be anſwer'd ?*

A. 1. Place the Numbers alternately, beginning at the *Left Hand*, and let the laſt Number ſtand on the *Left Hand.*

2. Multiply the *firſt Rank* continually for a Dividend, and the *ſecond* for a Diviſor.

Q. *How is* Conjoin'd Proportion *prov'd ?*

A. Make as many *Single Rules* of *Three* as the Nature of the Queſtion requires ?

EXAMPLES.

1. If 100℔ *Engliſh* make 95℔ *Flemiſh*, and 19℔ *Flemiſh* 25 ℔ at *Bologna* ; how many ℔ *Engliſh* are equal to 50℔ at *Bologna ? Anſw.* 40℔ Engliſh.

2. If 25℔ at *London* be 22℔ at *Nurenburgh* ; 88 ℔ at *Nurenburgh* 92℔ at *Hamburgh* ; 46℔ at *Hamburgh* 49℔ at *Lyons* ; how many ℔ at *London* are equal to 98 ℔ at *Lyons ? Anſw.* 100℔ *at* London.

3. If 6 Braces at *Leghorn* make 3 Ells *Engliſh* ; 5 Ells *Engliſh* 9 Braces at *Venice*, how many Braces at *Leghorn*, will make 45 Braces at *Venice ? Anſw.* 50 *Braces at* Leghorn.

4. If 3 Ells *Engliſh* make 6 Braces at *Leghorn*, and 50 Braces at *Leghorn* 135 Braces at *Venice* ; how many Ells *Engliſh* are equal to 27 Braces at *Venice ? Anſw.* 15 *Ells* Engliſh.

CASE 2.

Q. *When it is required to know how many of the* laſt *ſort of* Coin, Weight *or* Meaſure, *mentioned in the* Queſtion, *are equal to a given Number of the* firſt ; *how muſt the* Queſtion *be anſwered ?*

A. 1. Place the Numbers alternately, as in *Caſe* 1. but let the laſt Number ſtand on the *Right Hand.*

2. Multiply the *ſecond Rank* continually for a Dividend, and the *firſt* for a Diviſor.

Examples

EXAMPLES.

1. If 10 ℔ at *London* make 9 ℔ at *Amſterdam*, 90 ℔ at *Amſterdam* 112 ℔ at *Thoulouſe*; how many ℔ at *Thoulouſe* are equal to 50 ℔ at *London?* *Anſw.* 56 ℔ at Thoulouſe.

2. If 20 Braces at *Leghorn* be equal to 10 Vares at *Lisbon*; 40 Vares at *Lisbon* to 80 Braces at *Lucca*; how many Braces at *Lucca* are equal to 100 Braces at *Leghorn?* *Anſw.* 100 *Braces at* Lucca.

Of EXCHANGE.

Q. *WHAT is* Exchange?

A. *Exchange* is the giving of the *Money*, *Weight*, or *Meaſure* of one Country, for the like Value in *Bills*, *Money*, *Weight*, or *Meaſure* of another Country.

Q. *What is the* Courſe *of* Exchange?

A. It is the *Value* of Money agreed on among Merchants.

Q. *Is the* Courſe *of* Exchange *always the ſame?*

A. No: The *Courſe* of *Exchange* riſes or falls almoſt every Day, according as Money is plenty or ſcarce; or according to the *Time* allowed for the payment of the *Money* in *Exchange*, and then the Value is ſaid to be above or under *Par.*

Q. *What is the* Par *of* Exchange?

A. It is the intrinſic Value of any *Foreign Money* compared with *Starling Money.*

Q. *How are Queſtions in* Exchange *proved?*

A. By changing the Order of them.

CASE 1.

Q. *What Place does* London *exchange with in* Dollars, *or Pieces of Eight of* Mexico?

A. With *Madrid*, and *Cadiz* in *Spain*; *and* with *Genoa* and *Leghorn* in *Italy.*

Q. *How do they keep their Accompts in* Spain?

A. In *Rials* and *Marvadies.*

Note, 372 *Marvadies make* 1 *Rial.*
8 *Rials* ——— 1 *Piece of Eight.*

Q. *How do they keep their Accompts in* Italy?

Note, 12 *Deniers make* 1 *Sol.*
20 *Sols* ——— 1 *Livre.*
5 *Livres* ——— 1 *Piece of Eight at* Genoa.
6 *Livres* ——— 1 *Piece of Eight at* Leghorn.

EXAMPLES.

1. What is the Amount of 63*l.* Sterling in Pieces of Eight, at 56*d. per* Piece? *Anſw.* 270 *Pieces of Eight.*

2. A Factor hath ſold Goods at *Cadiz* for 1468 Pieces of Eight, at 4*s.* 6*d.* 2*qrs. per* Piece; how much Sterling is the Sum? *Anſw.* 333*l.* 7*s.* 2*d.*

CASE 2.

Q. *What Place does* London *exchange with for* Ducats?

A. With *Venice* in *Italy*.

Note, 6 *Solidi make* 1 *Groſs.*
24 *Groſſes*—— 1 *Ducat*

EXAMPLES.

1. There are 2000 Ducats, at 4*s.* 4*d.* each, remitted to *London* to be paid in Pounds Sterling, what is the Amount? *Anſw.* 433*l.* 6*s.* 8*d.*

2. A Bill of 100*l.* Sterling is remitted to *Venice* to be paid in Ducats, at 4*s.* 4*d.* each; what is the Amount? *Anſw.* 461 $\frac{28}{52}$ *Ducats.*

3. A Traveller would exchange 233*l.* 16*s.* 8*d.* Sterling for *Venice* Ducats, at 4*s.* 9*d. per* Ducat; how many muſt he have? *Anſw.* 984$\frac{32}{57}$.

CASE 3.

Q. *What Places does* London *exchange with for* French Crowns?

A. With *Paris*, *Lyons*, *Rouen*, &c. in *France*.

Q. *How do they keep their Accompts in* France?

A. In *Livres*, *Sols*, and *Deniers*.

Note, 12 *Deniers make* 1 *Sols*
20 *Sols* ——— 1 *Livre*
3 *Livres* ——— 1 *Crown.*

EXAMPLES.

1. A Bill of 200*l.* is remitted to *Paris* by a Merchant in *London*; what is the Value in *French* Crowns, at 4*s.* 6*d.* each? *Anſw.* 888 $\frac{48}{54}$ *Crowns.*

2. There are 800 *French* Crowns, at 4*s.* 6*d.* each remitted to *London* by a Merchant in *Paris*; what is the Value in Pounds Sterling? *Anſw.* 180*l.* *Sterling.*

CASE 4.

Q. *What Places does* London *exchange with for* Mill Rees?

A. With *Oporto* and *Liſbon*, &c. in *Portugal*, and with the Iſland of *Madeira*.

Q. *How do they keep their Accompts in* Portugal?

A. In *Reas*.

Note, 1000 *Reas make* 1 *Mill Rea.*

EXAMPLES.

2. If a Bill is drawn from *Liſbon* of 1432 Mill Reas, at 6*s.* 8*d. per* Piece; how much *Engliſh* Money is that Bill? *Anſw.* 477*l.* 6*s.* 8*d.*

2. If a Bill be drawn from *London* of 1333*l.* 6*s.* 8*d.* Sterling; how much is it at *Liſbon* in Mill-Reas, at 6*s.* 8*d.* each? *Anſw.* 400 *Mill Reas.*

CASE 5.

Q. *What Place does* London *exchange with for* Ducatoons?

A. With *Florence* in *Italy*.

EXAMPLES.

1. A Bill of 120 Ducatoons is remitted from *Florence*, at 53*d.* each; what is the Value in Pounds Sterling? *Anſw.* 26*l.* 10*s.*

2. A Bill of 220*l.* 16*s.* 8*d.* is drawn from *London*; what is the Value at *Florence* in Ducatoons, at 53*d.* ½ each? *Anſw.* 1000 *Ducatoons.*

CASE 6.

Q. *What Place does* London *exchange with for* Florins?

A. With *Frankfort* in *Germany*.

EXAMPLES.

1. If 224*l.* 1*s.* 8*d.* Sterling be remitted to *Frankfort*; what is the Value in Florins, at 59*d.* ½ *Anſw.* 1000 *Florins.*

2. If 100 Florins, at 59*d.* ½ each, be remitted from *Frankfort* to *London*; what is the Value in Pounds Sterling? *Anſw.* 24*l.* 15*s.* 10*d.*

CASE 7.

Q. *What Places does* London *exchange with by the* Pound Flemiſh *or* Pound Sterling?

A. With *Antwerp*, *Bruſſels*, *Amſterdam*, *Rotterdam*, and all Parts of the *Spaniſh* and *United Provinces*. Alſo with *Hamburg* in *Germany*.

Q. How do they keep their Accompts in theſe Places?

A. Some in *Pounds, Shillings* and *Pence,* as in *England*; and others in *Guilders, Stivers* and *Pennics.*

Note, 16 *Pennics make* 1 *Stiver.*
20 *Stivers* —— 1 *Guilder.* Alſo,
6 *Stivers* —— 1 *Shilling.*
6 *Guilders* —— 1 *Pound* Flemiſh.

EXAMPLES.

1. Being deſirous to remit to my Correſpondent at *London* the Sum of 2000*l.* 12*s.* 6*d* Flemiſh to diſpoſe of according to my Order. Exchange at 34*s.* 6*d.* Flemiſh, *per* Pound Sterling; how much Money Sterling ſhall I be Creditor for, in the City of *London* aforeſaid? *Anſw.* 1159*l.* 15*s.* 7*d.* 3*qrs.* $\frac{126}{414}$.

2. My Correſpondent in *England* gives me Notice, that he has diſburſed in Merchandize, upon my Account, the Sum of 1000*l.* Sterling; what Sum muſt I anſwer for that in *Holland,* the Courſe of Exchange being at 33*s.* 4*d.* Flemiſh for one Pound Sterling? *Anſw.* 1666*l.* 13*s.* 4*d. Flemiſh.*

Note, *When the* Courſe *of* Exchange *is at* 33s. 4d Flemiſh *for* 1 *Pound Sterling, then to bring* Flemiſh Money *into* Engliſh Money, *multiply the* Flemiſh Money *by* 3, *and divide that Product by* 5, *the Quotient will give* Pounds Sterling. *And the contrary.*

3. My Correſpondent in *Rotterdam* ſends me Word that he has diſburſed upon my Account the Sum of 3060 Guilders and 15 Stivers; what Sum muſt I anſwer for that at *London,* the Courſe of Exchange being at 37*s.* 9*d.* Flemiſh *per* Pound Sterling? *Anſw.* 270*l.* 5*s.* 3*d.* 2*qrs.* $\frac{118}{453}$.

Note a Stiver *is* 2*d.* Flemiſh, *and a* Guilder 40*d.*

4. A Merchant deliver'd at *London* 120*l.* Sterling, to receive 147*l.* Flemiſh, in *Amſterdam*; how much was 1*l.* valu'd at in Flemiſh Money? *Anſw.* 1*l.* 4*s.* 6*d.*

CASE 8.

Of the Compariſon of Weights and Meaſures.

EXAMPLES.

1. If 112lb at *London* make 99lb at *Lisbon,* how many lb at *London* are equal to 1049 lb at *Lisbon*? *Anſw.* 1186lb$\frac{74}{99}$.

2. If 112lb at *London* make 98 lb at *Roan,* how many lb at *Roan* are equal to 1000lb at *London*? *Anſw.* 875lb.

3. If 100 Ells *Engliſh* make 108 Braces at *Venice*; how many Ells *Engliſh* are equal to 1000 Braces at *Venice?* *Anſ.* 925 *Ells* $\frac{100}{108}$.

4. If 100 Ells at *London* make 145 Ells at *Vienna*; how many Ells at *Vienna* are equal to 10 Ells at *London?* *Anſw.* 14 *Ells* $\frac{1}{2}$.

Of ALLIGATION.

Q. HOW *many kinds of* Alligation *are there?*
A. Two: *Alligation Medial*, and *Alligation Alternate*.

Of ALLIGATION MEDIAL.

Q. *What is* Alligation Medial?

A. *Alligation Medial* is when the Quantities and Prices of ſeveral Things are given to find the mean Price of the Mixture compounded of thoſe Things.

Q. *What is the* Rule?

A. As the *whole Compoſition*
Is to its *Total Value*:
So is any *Part* of the *Compoſition*
To its *mean Price*,

Q. *How is* Alligation Medial *proved?*

A. Find the Value of the whole Mixture at the *mean Rate*, and if it agrees with the Total Value of the ſeveral Quantities, at their reſpective Rates, the Work is right.

EXAMPLES.

1. A Farmer mingled 19 Buſhels of Wheat, at 6*s.* *per* Buſhel, and 40 Buſhels of Rye, at 4*s.* *per* Buſhel, and 12 Buſhels of Barley, at 3*s.* *per* Buſhel together; I demand what a Buſhel of this Mixture is worth? *Anſw.* 4*s.* 4*d.* 1*qr.* $\frac{41}{71}$.

2. A Farmer mingled 20 Buſhels of Oats, at 2*s.* *per* Buſhel, and 30 Buſhels of Beans, at 2*s.* *per* Buſhel, and 20 Buſhels of Peas, at 3*s.* *per* Buſhel together; I demand the worth of a Buſhel of this Mixture? *Anſw.* 2*s.* 3*d.* 1*qr.* $\frac{5}{7}$.

3. A Vintner mingled 5 Gallons of Canary at 8*s.* *per* Gallon, and 6 Gallons of Malaga, at 7*s.* *per* Gallon, and 4 Gallons of White wine, at 6*s.* *per* Gallon together; I demand what a Gallon of this Mixture is worth? *Anſw.* 7*s.* 0*d.* 3*qr* $\frac{1}{5}$

4. A Grocer mingled 2 *C.* of Sugar at 56*s.* *per C.* and 1 *C.* at 43*s* *per C.* and 2 *C.* at 50*s.* *per C.* together; I demand the Price of 3 *C* of this Mixture? *Anſw.* 7*l.* 13*s*

5. An Alehouſe-keeper mixed 3 ſorts of Ale together *viz.* 12 Gallons at 6*d. per* Gallon, 16 Gallons at 7*d. per* Gallon, and 21 Gallons at 9*d. per* Gallon; I demand what 1 Gallon of this Mixture is worth? *Anſw.* 7*d.* 2*qrs.* $\frac{22}{49}$

6. A Refiner having 5lb of Silver Bullion of 8*oz.* fine, 10lb of 7 *oz.* fine, and 15lb of 6*oz.* fine, would melt all together; I demand what fineneſs 1lb of this Maſs ſhall be? *Anſw.* 6*oz.* 13 *dwts.* 8 *gr. fine.*

7. Mint-maſter hath 3lb weight of Gold of 22 Carrats fine, and 3lb of 20 Carrats fine; I demand what fineneſs an *oz.* of this Mixture will bear? *Anſw.* 21 *Carrats fine.*

8. An Hoſtler mixing Provender for his Horſes, would put in a Quantity of Beans at 5*s per* Buſhel, with the like Quantity of Oats at 3*s.* 6*d. per* Buſhel; I demand the Price of a Buſhel of this mixture? *Anſw.* 4*s.* 3*d.*

9. A Malſter hath ſeveral ſorts of malt, viz. one ſort at 4s. 6d. another at 4s. and a third at 3s. 6d. per Buſhel, and he would mix an equal Quantity of each together; I demand the Price of a Buſhel of this mixture; *Anſw.* 4s.

10. A Brewer hath ſeveral ſorts of Ale, *viz.* one ſort of 20*s. per* Barrel, another at 25*s.* a third at 30*s.* and a fourth at 35*s. per* Barrel, and he would mix an equal Quantity of each together; I demand the Price of a Barrel, and alſo of a Gallon of this mixture? *Anſw.* 27*s.* 6*d.* per *Barrel*, and 10*d.* 1*qr.* $\frac{8}{32}$ per *Gallon.*

Of ALLIGATION ALTERNATE.

Q. *What is* Alligation Alternate?

A. *Alligation Alternate* is, when the Rates of ſeveral Things are given to find ſuch Quantities of them, as are neceſſary to make a *Mixture*, which may bear a certain Rate propounded.

Q. *How are the Rates or Prices of the given Things to be ordered?*

A. 1. They muſt be placed one over the other, and the propounded *Price* of the *Compoſition* againſt them, thus,

$$\textit{Mean Rate } 7 \begin{cases} 4 \\ 5 \\ 6 \\ 8 \end{cases} \textit{Prices of the Simples.}$$

2. Link the ſeveral *Rates* together, in ſuch ſort, that one *greater* than the *mean Rate* may be coupled to another which is *leſs*.

5. Take the *Differences* between the *mean Rate* and the ſeveral *Prices*, and place them each againſt his Yoke fellow: And for the reſt, obſerve the following *Caſes*.

CASE I.

Q. *When the* Prices *of the ſeveral* Things *together with the* mean Rate *of the* mixture *are given, without any* Quantity *to find how much of each* Ingredient *is required to compoſe the* mixture; *how muſt the Operation be wrought?*

A. Take the *Differences* between each *Price*, and the *mean Rate*, and ſet them alternately, and they will be the Quantities required.

Q. *How are the Operations in* this *and the following* Caſes *proved?*

A. They are all proved by *Alligation Medial.*

EXAMPLES.

1. How much Rye at 4*s.* *per* Buſhel, Barley at 3*s* *per* Buſhel, and Oats at 2*s.* *per* Buſhel, will make a mixture worth 2*s.* 6*d.* *per* Buſhel? *Anſw.* 6 *Buſhels of Rye*, 6 *Buſhels of Barly, and* 24 *Buſhels of Oats.*

2. How many Raiſins of the Sun at 7*d.* *per* lb and *Malaga* Raiſins at 4*d.* *per* ℔ may be mixed together, for 6*d.* *per* ℔? *Anſw.* 2 lb *of Raiſins of the Sun, and* 1lb *of Malaga Raiſins.*

Note, *Queſtions in this Rule do frequently admit of an infinite variety of* Anſwers, *and all in* Whole Numbers; *as in this laſt* Example *where tho' 2 and 1 do anſwer the* Queſtion, *yet any other* two Numbers *will as truly do the like, that are in the ſame* Proportion.

For 2 : 1 ::
4 : 2
6 : 3
8 : 4
16 : 8
40 : 20, &c. *without End,*

A Grocer would mix three ſorts of Sugar together, *viz.* one ſort at 10*d.* *per* lb, another at 7*d.* and another at 6*d.* how much of each ſort muſt he take, that the whole mixture may be ſold for 8*d.* *per* lb?

Anſw.
lb *d. per* lb
3 *at* 10
2 *at* 7
2 *at* 6

4. A malſter hath ſeveral ſorts of malt, *viz.* one ſort at 4*s. per* Buſhel another at 3*s.* 6*d.* a third at 3*s.* and a fourth at 2*s. per* Buſhel, and he is deſirous to mix ſo much of each ſort together, that the Whole may be ſold at 2*s.* 6*d. per* Buſhel; I demand how much he muſt take of each ſort?

	Buſh.		*d.per Buſh.*
Anſw.	6	*at*	48
	6	*at*	42
	6	*at*	36
	36	*at*	24

5. A Druggiſt hath ſeveral ſorts of Tea, *viz.* one ſort at 12*s. per* lb, another at 11*s* a third at 9*s.* and a fourth 8*s. per* lb; I demand how much of each ſort he muſt mix together, that the whole Quantity may be afforded at 10*s. per* lb?

	lb		*s p* lb
1 *Anſw.*	2	*at*	12
	1	*at*	11
	1	*at*	9
	2	*at*	8

	lb		*s.p.* lb
2 *Anſw.*	3	*at*	12
	2	*at*	11
	2	*at*	9
	3	*at*	8

	lb		*s. p.* lb
3 *Anſw.*	1	*at*	12
	2	*at*	11
	2	*at*	9
	1	*at*	8

	lb		*s. p.*lb
4 *Anſw.*	1	*at*	12
	3	*at*	11
	3	*at*	9
	1	*at*	8

	lb		*s. p.*lb
5 *Anſw.*	3	*at*	12
	3	*at*	11
	3	*at*	9
	3	*at*	8

	lb		*s.p.* lb
6 *Anſw.*	3	*at*	12
	1	*at*	11
	3	*at*	9
	2	*at*	8

	lb		*s. p.* lb.
7 *Anſw.*	2	*at*	12
	3	*at*	11
	1	*at*	9
	3	*at*	8

Note, *Theſe* ſeven Anſwers *ariſe from as many different Ways of linking the* Rates *of the Simples together.*

6. How much alloy muſt I mix with Bullion of 10 *oz.* fine to abaſe the ſame to 8 *oz.* fine? *Anſw. To every* 8 *oz. of Bullion of* 10 *oz. fine, put* 2 *oz. of Alloy, and that will abaſe it to* 8 *oz. fine.*

CASE 2.

Of Alternation Partial.

Q. *When the* Rates *of all the* Things *the* Quantity *of but one of them, and the* mean Rate *of the whole* Mixture *are given to find the ſeveral* Quantities *of the reſt, in Proportion to the* Quantity *given; how are theſe* Quantities *found?*

A. Take the *Differences* between each *Price* and the *mean Rate,* and place them alternately; as in *Caſe* 1. Then ſay,

As the *Difference* of the ſame Name with the *Quantity* given
Is to the reſt of the *Differences* ſeverally;
So is the *Quantity* given
To the ſeveral *Quantities* required.

EXAMPLES.

1. A Man being determined to mix 10 Buſhels of Wheat at 4*s.* *per* Buſhel, with Rye at 3*s.* with Barley at 2*s.* and with Oats at 1*s.* *per* Buſhel; I demand how much Rye, Barly and Oats muſt be mixed with the 10 Buſhels of Wheat, that the Whole may be ſold for 28*d.* *per* Buſhel?

1 *Anſw.*
B *p of*
2 2 *of Rye*
5 0 *of Barly*
12 2 *of Oats*

2 *Anſw.*
B
40 *of Rye*
50 *of Barly*
20 *of Oats*

3 *Anſw.*
B
8 *of Rye*
10 *of Barly*
14 *of Oats*

4 *Anſw.*
B
10 *of Rye*
14 *of Barly*
14 *of Oats*

5 *Anſw.*
B *p.*
12 2 *of Rye*
5 0 *of Barly*
17 2 *of Oats*

6 *Anſw.*
B.
2 *of Rye*
14 *of Barly*
10 *of Oats*

7 *Anſw.*
B.
50 *of Rye*
70 *of Barly*
20 *of Oats*

2. A Man being determined to mix 12 Buſhels of Oats, at 18*d.* *per* Buſhel, with Barly at 30*d.* with Rye at 36*d.* and with Wheat at 4*s.* *per* Buſhel; I demand how much Barly, Rye and Wheat muſt be mixed with the 12 Buſhels of Oats, that it may bear the Price of 22*d.* *per* Buſhel? *Anſw.* 1 *Buſhel of each ſort.*

3. A Man being dermined to mix 12 Buſhels of Oats, at 18*d. per*Buſhel, with Barly at 30*d.* with Rye at 3*s.* and with Wheat at 4*s. per* Buſhel; I demand how much Barly, Rye, and Wheat muſt be mixed with the 12 Buſhels of Oats, that the Whole may bear the Price of 2*s.* 9*d. per* Buſhel?

1 *Anſw.*
B
60 *of Barly*
60 *of Rye*
12 *of Wheat*

2 *Anſw.*
B. *p.*
2 1 $\frac{9}{15}$ *of Barly*
2 1 $\frac{9}{15}$ *of Rye*
12 0 *of Wheat*

3 *Anſw.*
B
10 *of Barly*
10 *of Rye*
12 *of Wheat*

4 *Anſw.*
B
72 *of Barly*
72 *of Rye*
12 *of Wheat*

5 *Anſw.*
B
2 *of Barly*
12 *of Rye*
10 *of Wheat*

6 *Anſw.*
B. *p.*
14 1 $\frac{9}{15}$ *of Barly*
2 1 $\frac{9}{15}$ *of Rye*
14 1 $\frac{9}{15}$ *of Wheat.*

7. *Anſw.* 12 *Buſhels of each ſort.*

4. A Man being determined to mix 12 Buſhels of Oats, at 18*d. per* Buſhel, with Barley at 2*s.* 6*d.* with Rye at 3*s.* and with Wheat at 4*s. per* Buſhel; I demand how much Barly, Rye and Wheat muſt be mixed with the 12 Buſhels of Oats, that the whole Quantity may bear the Price of 3*s.* 6*d. per* Buſhel.

Anſw.
B
12 *of Barly*
12 *of Rye*
84 *of Wheat*

5. A Man intends to mix 28 Buſhels of Oats, at 18*d. per* Buſhel, with Barly at 2*s.* 6*d.* with Rye at 3*s.* and with Wheat at 4*s.* I would know how much Barly, Rye, and Wheat ought to be added to the 28 Buſhels of Oats, that the whole Quantity may be afforded at 2*s. per* Buſhel? *Anſw.* 4 *Buſhels of each ſort.*

6. A Farmer would mix 27 Buſhels of Peas, at 18*d. per* Buſhel, with Oats at 28*d.* and with Beans at 30*d. per* Buſhel, that the whole Quantity may bear the Rate of 20*d. per* Buſhel; I demand how much Oats and Beans muſt be mixed with the 27 Buſhels of Peas? *Anſw.* 3 *Buſhels of each ſort.*

Caſe

CASE 3.

Of Alligation Total.

Q. *When the* Rates *of the ſeveral* Things, *the* Quantity *to be compounded, and the* mean Rate *of the whole* Mixture *are given to find how much of each ſort will make up that* Quantity; *how are thoſe* Quantities *diſcovered?*

A. Place the *Differences* between the ſeveral *Prices*, and the *mean Rate*, alternately, as in *Caſe* 1. Then ſay,

As the *Sum* of the *Differences*
Is to the *whole Compoſition*;
So is the *Difference* of each *Rate*
To the *Quantity* of the ſame *Rate*.

EXAMPLES.

1. A Grocer hath 4 ſorts of Sugar, *viz.* at 8*d. per* lb, at 6*d. per* ℔, at 4*d. per* ℔, and at 2*d. per* ℔, and he would have a Compoſition of an *Cwt.* worth 5*d. per* ℔; I demand how much of each ſort he muſt take?

1 *Anſw.*

℔	*d.p.*℔
42	*at* 8
14	*at* 6
14	*at* 4
42	*at* 2
112	

2 *Anſw.*

℔	*d p.*℔
14	*at* 8
42	*at* 6
42	*at* 4
14	*at* 2
112	

3 *Anſw.*

lb	*oz.*	*dr.*	*d p.*lb
28	0	0	*at* 8
37	5	$5\frac{4}{12}$	*at* 6
9	5	$5\frac{4}{12}$	*at* 4
37	5	$5\frac{4}{12}$	*at* 2
112	0	0	

4 *Anſw.*

lb	*oz.*	*dr.*	*d.p.*lb
37	5	$5\frac{4}{12}$	*at* 8
9	5	$5\frac{4}{12}$	*at* 6
37	5	$5\frac{4}{12}$	*at* 4
28	0	0	*at* 2
112	0	0	

5 *Anſw.*

lb	*oz.*	*dr.*	*d.p.*lb
11	3	$3\frac{2}{10}$	*at* 8
44	12	$12\frac{8}{10}$	*at* 6
44	12	$12\frac{8}{10}$	*at* 4
11	3	$3\frac{2}{10}$	*at* 2
112	0	0	

6 *Anſw.*

lb	*d.p.*lb
32	*at* 8
24	*at* 6
24	*at* 4
32	*at* 2
112	

7 *Anſw.* 28lb *of each ſort.*

2. A Vintner hath 4 ſorts of Wine, *viz.* Canary at 10*s. per* Gallon, Malaga at 8*s.* Rheniſh at 6*s.* and Oporto at 4*s.* and he is minded to make a Compoſition of 60 Gallons, worth 9*s. per* Gallon; I demand how much of each ſort he muſt have?

Anſw.
Gals.
45 *of Canary*
5 *of Malaga*
5 *of Rheniſh*
5 *of Oporto*
60

3. A Brewer hath 3 ſorts of Ale, *viz.* at 10*d.* at 8*d.* and at 6*d. per* Gallon, and he would have a Compoſition of 30 Gallons, worth 7*d. per* Gallon; I demand how much of each ſort he muſt have?

Anſw.
Gals. *d. p. Gallon.*
5 *at* 10
5 *at* 8
20 *at* 6
30

4. A Goldſmith hath ſeveral ſorts of Gold, *viz.* ſome of 24 Carats fine, ſome of 22 Carrats, and ſome of 18 Carrats fine; and he would have compounded of theſe ſorts the Quantity of 60 *oz.* of 20 Carrats fine; I demand how much of each ſort he muſt take?

Anſw.
Oz.
12 *at* 24 *Carrats fine*
12 *at* 22 *Carrats fine*
36 *at* 18 *Carrats fine*
60

5. A Goldſmith hath Gold of 3 ſorts, *viz.* of 22 Carats, of 21 Carats, and of 20 Carrats fine, and he would mix with theſe ſo much Alloy, as that the Quantity of 21 *oz.* may bear 18 Carrats fine; I demand how much of each ſort he muſt take, and how much Alloy?

Anſw.
Oz
6 *of* 22 *Carrats fine*
6 *of* 21 *Carrats fine*
6 *of* 20 *Carrats fine*
3 *of Alloy*
21

6. A Druggiſt hath three ſorts of Drugs, one was worth 4*s.* *per* ℔. another 5*s.* and another 8*s.* and out of theſe he made two Parcels, one was 21 ℔ at 6*s.* *per* ℔, and the other 35 ℔ at 7*s.* *per* ℔; how much of every ſort did he take for each Parcel?

	℔	*s.p.*℔	℔	*s.p.*℔
Anſw.	6	*at* 4	5	*at* 4
	6	*at* 5	5	*at* 5
	9	*at* 8	25	*at* 8
	21	*at* 6*s.* *per* ℔	35	*at* 7*s.* *per* ℔.

Of POSITION.

Q. W*HAT is* Poſition *or* Negative Arithmetic?

A. It is that which finds out a Truth by ſuppoſed Numbers.

Q. *How many kinds of* Poſition *are there?*

A. Two: *Single* and *Double.*

Of SINGLE POSITION.

Q. *What is* Single Poſition?

A. It is that which diſcovers the true Number ſought, by only *one* ſuppoſed Number.

Q. *How is that* ſuppoſed Number *uſed?*

A. By working with it, as if it was the true Number, in the ſame Proportion as the Queſtion directs; and if the Reſult be either too much or too little, the true Number may be found out by the following Rule, *viz.*

As the *Reſult* of the *Poſition*
Is to the *Poſition*:
So is the *given Number*
To the *Number required.*

Q. *How do you prove* Poſition?

A. *Poſition,* both *Single* and *Double,* is proved by adding the ſeveral *Sums* required, or the ſeveral *Parts* of the *Sum* required together; and if that *Sum* agrees with the given *Sum,* it is right.

EXAMPLES.

1. Two Men, *A* and *B*, having found a Bag of Money, diſputed who ſhould have it; *A* ſaid the half, third and fourth of the Money made 130*l.* and if *B* could tell how much was in it, he ſhould have it all, otherwiſe he ſhould have nothing; I demand how much was in the Bag? *Anſw.* 120*l.*

2. *A, B* and *C* determining to buy together a certain Quantity of Timber, worth 36*l.* agree that B ſhall pay ⅓ more than *A*, and *C* ¼ more than *B*; I demand how much each Man muſt pay? *A* 9*l.* *B* 12*l.* *C* 15*l.*

3. A Perſon having about him a certain Number of Crowns, ſaid, if the half, third and fourth of them were added together they would make 65 Crowns; I demand how many he had? *Anſw.* 60 *Crowns.*

4. *A* lent *B* a Sum of Money, to be paid at 4 Payments; when 3 of them were made, and *A* came to demand the fourth, *B* would give him no more, except he would tell him how much was paid already; *A* ſaid, the firſt Payment was a fourth, the ſecond a fifth, and the third a ſixth of the Sum firſt lent, and altogether made 74*l.* I demand the Sum lent? *Anſw.* 120*l.*

5. One Man carrying a Bag of Mony in his Hand, another aſked him, how much was in it; he anſwered, he could not tell, but the third, fourth and fifth of it made 94*l* how much was in the Bag? *Anſw.* 120*l.*

6. I have delivered to a Banker a certain Sum of Money, to receive of him after the rate of 6*l.* *per Cent per Annum*, and at the End of ten Years he paid me 500*l.* for Principal and Intereſt together; I demand the Sum delivered to him at firſt? *Anſw.* 312*l.* 10*s,*

Of DOUBLE POSITION.

Q. *What is* Double Poſition?

A. It is that which diſcovers the true Number ſought, by making uſe of *two* ſuppoſed Numbers.

Q. *How are thoſe ſuppoſed Numbers uſed?*

A. 1. By working with them as if they were the true Numbers, in the ſame Proportion as the Queſtion directs.

2. The *Reſults* or *Errors* muſt be placed againſt their *Poſitions*, or ſuppoſed Numbers; thus,

3. Multiply them *Croſs wiſe*

4. If the *Errors* are *alike, i. e.* both greater or both leſs than the given Number, take their *Difference* for a *Diviſor*, and the *Difference* of the *Products* for a *Dividend.*

Pos.	*Er.*
40	28
36	19

5. If the *Errors* are *unlike,* take the *Sum* of the *Errors* for a *Diviſor,* and the *Sum* of the *Products* for a *Dividend,* the *Quotient* thence ariſing will be the *Anſwer.*

EXAMPLES.

1. *A, B* and *C* would divide 100*l.* between them, ſo, as that *B* may have 3*l.* more than *A,* and *C* 4*l.* more than *B*; I demand how much each Man muſt have? *Anſw. A.* 30*l. B* 33*l. C* 37*l.*

2. A Man lying at the Point of Death, ſaid, he had in a certain Coffer 100*l.* which he bequeathed to 3 of his Friends, after this manner; the firſt muſt have a certain Portion, the ſecond muſt have twice as much as the firſt, wanting 8*l.* and the third muſt have three times as much as the firſt, wanting 15*l.* I demand how much muſt each Man have? *Anſw. The Firſt* 20*l.* 10*s. Second* 33*l. Third* 46*l.* 10*s.*

3. *A, B* and *C* built a Houſe which coſt 100*l.* of which *A* paid a certain Sum, *B* paid 10*l.* more than *A,* and *C* paid as much as *A* and *B,* I demand each Man's Share in that Charge? *Anſw. A paid* 20*l. B* 30*l. C* 50*l.*

4 ThreePerſons diſcourſed together concerning their Ages; ſays *A,* I am 20 Years of Age, ſays *B,* I am as old as *A* and half *C,* and ſays *C,* I am as old as you both; I demand the Age of each Perſon? *Anſw. A was* 20, *B* 60, *C* 80 *Years of Age.*

4. A Man lying at the Point of Death, left to his 3 Sons all his Eſtate in Money, *viz.* to *F* half, wanting 50*l.* to *G* one third, and to *H* the reſt, which was 10*l* leſs than the Share of *G*; I demand the Sum left, and each Man's Part? *Anſw. The Sum left was* 360*l. whereof F had* 130*l. G* 120*l. H* 110*l.*

6. A certain Man having drove his Swine to the Market, *viz* Hogs, Sows, and Pigs, received for them all 50*l.* being paid for every Hog 18*s.* for every Sow 16*s.* for every Pig 2*s.* there were as many Hogs as Sows, and for every Sow there were three Pigs; I demand how many there were of each, ſort? *Anſw.* 25 *Hogs,* 25 *Sows,* 75 *Pigs.*

7. A ſurly old Fellow being demanded the Ages of his Children anſwered, You may go and look; but if you muſt needs know, my firſt Son was born juſt 1 Year after I was married to his Mother. who, after his Birth lived 5 Years, and then died in Child-bed with my ſecond Son; 4 Years after that I married again, and within 2 Years had my third and fourth Sons at a Birth, the Sum of whoſe two Ages is now equal to that of the eldeſt; I demand their ſeveral Ages? *Anſw. The firſt Son was* 22 *Years old, the ſecond* 17, *the third* 11, *and the fourth* 11 *Years old.*

Of COMPARATIVE ARITHMETIC.

WHAT *is* Comparative Arithmetic?

A. It is ſuch, as anſwers Queſtions by Numbers, having *Relation* one to another.

Q. *Wherein does this Relation conſiſt?*

A. It conſiſts either in *Quantity* or *Quality.*

Q. *What is Relation of Numbers in* Quantity?

A. It is the *Reſpect* that one Number has to another.

Q. *How many are the Numbers propounded?*

A. They are always two, the *Antecedent* and the *Conſequent.*

Q. *In what does Relation of Numbers* in Quantity *conſiſt?*

A. It conſiſts in the *Difference*, or elſe in the *Rate* or *Reaſon* that is found between the Terms propounded.

Note, *The* Difference *of any two Numbers is the* Remainder, *but the* Rate *or* Reaſon *is the* Quotient *of the* Antecedent *divided by the* Conſequent.

Q. *What is Relation of Numbers in* Quality *or* Progreſſion?

A. *Progreſſion* or *Proportion* is the *Reſpect* that the Reaſon of Numbers have one to another.

Q. *How many muſt the Terms be?*

A. *Three* or *more*; but never *leſs*: Becauſe *leſs* than *three* will not admit of a Compariſon of *Reaſons* or *Differences.*

Of PROGRESSION.

Q. *How many kinds of* Progreſſion *are there?*

A. Two: *Arithmetical* and *Geometrical*

Of ARITHMETICAL PROGRESSION.

Q. *What is* Arithmetical Progreſſion?

A. *Arithmetical Progreſſion* is when ſeveral Numbers have equal Differences, as 1, 2, 3, 4, differ by 1; or 2, 4, 6, 8, differ by 2.

Note 1. *If any Number of Terms differ by* Arithmetical Progreſſion, *the* Sum *of the two* Extreams *will be equal to the* Sum *of any two* Means *equally diſtant from the* Extreams. *As in* 2, 4, 6, 8; *where* $2+8$ *are* $=4+6=10$, *and ſo of any larger Number of* Terms.

2. *If the Number of* Terms *be odd, the middlemoſt ſupplies the Place of two* Terms. *As in* 1, 2, 3, *where* $1+3$ *are* $=2+2=4$.

CASE 1.

Q. *When the two* Extreams, *and the Number of* Terms *in any* Series of *Numbers in* Arithmetical Progreſſion *are given, and the* Sum *of all the Terms is required; how is that* Sum *found?*

A. Multiply the *Sum* of the two *Extreams* by half the Number of *Terms*: Or,

Multiply half the *Sum* of the *Extreams* by the whole Number of *Terms*, the *Product* is the Total of all the *Terms*.

EXAMPLES.

1. How many Strokes does the Hammer of a Clock ſtrike in 12 Hours? *Anſw.* 78.

2. A Merchant hath ſold 100 Yards of ſuperfine Cloth, *viz.* the firſt Yard for 1*s.* the ſecond for 2*s.* the third for 3*s.* &c. I demand how much he received for the ſaid Cloth? *Anſw.* 252*l.* 10*s.*

3. Bought 19 Yards of Shalloon, and gave 1*d* for the firſt Yard, 3*d.* for the ſecond, 5*d.* for the third, *&c.* increaſing 2*d.* every Yard; I demand what I gave for the 19 Yards? *Anſw.* 1*l.* 10*s.* 1*d.*

4. A Mercer ſold 20 Yards of Silk, at 3*d.* for the firſt Yard, 6*d.* for the ſecond, 9*d.* for the third, *&c.* increaſing 3*d.* for every Yard; I demand what he ſold the 20 Yards for? *Anſw.* 2*l.* 12*s.* 6*d.*

5. A Butcher bought 100 Head of Cattle. *viz.* Oxen, and gave for the firſt Ox 1 Crown, for the ſecond Ox 2 Crowns, for the third Ox 3 Crowns, *&c.* I demand what the Cattle coſt him? *Anſw.* 1262*l.* 10*s.*

6. Admit 100 Stones were laid 2 Yards diſtant from each other in a right Line, and a Baſket placed 2 Yards from the firſt Stone; I demand how many Miles a Man ſhall go in gathering them ſingly into the Baſket? *Anſw.* 11 *Miles*, 3 *Furlongs*, 180 *Yards* Engliſh *Meaſure*, or 9 *Miles*, 5 *Perches*, 5 *Yards* Iriſh *Meaſure*.

7 A Merchant ſold 1000 Yards of Linen at 2 Pins for the firſt Yard, 4 for the ſecond 6 for the third, *&c.* increaſing 2 Pins for every Yard; I demand how much the Linen produced, when the Pins were afterwards ſold at 12 for a Farthing? Alſo whether the ſaid Merchant gained or loſt by the Sale thereof, and how much ſuppoſing the ſaid Linen to have been bought at 6*d.* *per* Yard?

Anſw. { The Linnen produced 86*l.* 17*s.* 10*d.*
{ The Merchant gained 61 17 10

CASE 2.

Q. *When the two* Extreams, *and the Number of* Terms *in any* Series *of Numbers in* Arithmetical Progreſſion *are given, and the* common Difference *of all the* Terms *in that* Series *are required; how is that* Difference *found?*

A. Divide the *Difference* between the two *Extreams* by the Number of *Terms*, leſs *one*; the *Quotient* will be the *common Difference.*

EXAMPLES.

1. There are 21 Men, whoſe Ages are equally diſtant from each other in Arithmetical Progreſſion: the youngeſt is 20 Years old, and the eldeſt is 60; I demand the common Difference of their Ages, and the Age of each Man? *Anſw. The common Difference is* 2 Years; *therefore*

Years.
60 *is the age of the firſt Man.*
60—2=58 *is the age of the ſecond.*
58—2=56 *is the age of the third.*
56—2=54 *is the age of the fourth,* &c.

2. A Debt is to be diſcharged at 16 ſeveral Payments, in Arithmetical Proportion, the firſt Payment is to be 14*l.* the laſt 100*l.* what is the whole Debt, and what muſt each Payment be? *Anſw. The whole Debt is* 912*l. the common Difference is* 5*l.* 14*s.* 8*d. therefore,*

14*l.* 0*s.* 0*d.* *1ſt Payment*
14*l.*+5*l.* 14*s.* 8 =19 14 8 2*d.*
19*l.* 14*s.* 8*d.*+5 14 8 =25 9 4 3*d.*
25 9 4 +5 14 8 =31 4 0 4*th*, &c.

3. A Man is to travel from *York* to a certain Place in 12 Days, and to go but three Miles the firſt Day, increaſing every Days Journey by an equal Exceſs, ſo that the laſt Day's Journey may be 36 Miles; what will each Days Journey be, and how many Miles in the Place he goes to diſtant from *York*? *Anſw. The common Difference is* 3, *therefore,*

Miles.
3 *is the firſt Day's Journey.*
3+3= 6 *is the ſecond.*
6+3= 9 *is the third.*
9+3=12 *is the fourth,* &c.

4. A running Footman, on a Wager, is to travel from *London* Northward, as follows; that is to ſay, he is to go 4 Miles the firſt Day, and 40 Miles the laſt Day, and to go the whole Journey in 10 Days, increaſing every Day's Journey by an equal Exceſs; I demand the Number of Miles he travelled each Day, and the Length of the whole Journey?

Anſw. The common Difference is 4, *therefore,*

M.
4 *is the firſt Day's Journey.*
$4+4=$ 8 *is the ſecond.*
$8+4=12$ *is the third* &c.
The whole Journey is 220 *Miles.*

Of GEOMETRICAL PROGRESSION.

Q. *What is* Geometrical Progreſſion?

A. When any *Rank* or *Series* of Numbers *increaſes* by one *common Multiplier*, or *decreaſes* by one *common Diviſor*, thoſe Numbers are continued in *Geometrical Progreſſion*, as 3, 6, 12, 24, increaſe by the *Multiplier* 2; and 24, 12, 6, 3, decreaſe by the *Diviſor* 2.

Note 1. *If any Number of* Terms *be continued in* Geometrical Progreſſion, *the* Product *of the two* Extreams *will be equal to the* Product *of any two* Means *equally diſtant from the* Extreams, *as in* 3, 6, 12, 24, *where* 3×24 *are* $=6\times12=72$; *and ſo of any larger Number of* Terms.

2. *If the Number of* Terms *be odd, the middlemoſt ſupplies the Place of two* Terms, *as in* 3, 6, 12; *where* 3×12 *are* $=6\times6=36$

3. *The* common Multiplier *and the* common Diviſor *are called* Ratios.

Q. *How is the* Sum *of any* Series *in* Geometrical Progreſſion *obtained?*

A. 1. When all the *Terms* alone are given, then from the *Product* of the *ſecond* and *laſt Terms*, ſubtract the *Square* of the *firſt Term*, that *Remainder* being divided by the *ſecond Term*, leſs the *firſt*, will give the *Sum* of all the *Terms*.

2. When the two *Extreams* and the *Ratio* are only given; then multiply the *laſt Term* into the *Ratio*, and from that *Product* ſubtract the *firſt Term*, that Remainder divide by the *Ratio*, leſs an *Unit* or 1, the *Quotient* is the *Sum* of all the *Terms*.

Note 1. *As the laſt* Term *in a long* Series *of Numbers is very tedious to come at by continual* Multiplication; *it would be neceſſary for the readier finding it out, to have a* Series *of Numbers in* Arithmetical Proportion, *called* Indices, *beginning with an* Unit, *whoſe* common Difference *is* One: *Alſo whatever Number of* Indices *you make choice of, let let as many Numbers (in ſuch* Geometrical Proportion *as is given in the Queſtion) be placed under them;*

Thus, { 1, 2, 3, 4, 5, 6, 7 *Indices*
{ 2, 4, 8, 16, 32, 64, 128 *Numbers in Geomet. Propor.*

2. *But if the* firſt Term *in* Geometrical Proportion *be different from the* Ratio, *the* Indices *muſt begin with a* Cypher;

Thus, { 0, 1, 2, 3, 4, 5, 6 *Indices*
{ 1, 2, 4, 8, 16, 32, 64 *Numbers in Geomet. Propor.*

3. *When the* Indices *begin with a* Cypher, *the Sum of the* Indices *made choice of, muſt always be* one *leſs than the Number of* Terms *given in the Queſtion; becauſe* 1 *in the* Indices *ſtands over the* ſecond Term, *and* 2 *in the* Indices *ſtands over the* third Term, *&c.*

4. *Add any two of theſe* Indices *together and that* Sum *will directly correſpond with the* Product *of their reſpective* Terms.

5. *By the help of theſe* Indices, *and a few of the firſt* Terms *in any* Series *of* Geometrical Proportion, *any* Term *whoſe Diſtance from the* firſt Term *is aſſigned, tho' it be never ſo far, may ſpeedily be obtained, without producing all the* Terms.

EXAMPLES.

1. A Man bought a Horſe, and by Agreement was to give a Farthing for the firſt Nail, two for the ſecond, four for the third, *&c* there were four Shoes, and eight Nails in each Shoe; I demand what the Horſe was worth at that Rate? *Anſw.* 4473924*l.* 5*s* 3*d.* 3*qrs.*

2. A Merchant ſold 15 Yards of Sattin, the firſt Yard for 1*s.* the ſecond for 2*s.* the third for 4*s.* the fourth for 8*s.* I I demand the Price of the 15 Yards? *Anſw.* 1638*l.* 7*s*

3. A Draper ſold 20 Yards of ſuperfine Cloth the firſt Yard for 3*l.* the ſecond for 9*d.* the third for 27*d.* *&c.* in triple Proportion Geometrical; I demand the Price of the Cloth? *Anſw.* 21792402*l.* 10*s.*

4. A Goldſmith ſold 1℔ of Gold, at a Farthing for the firſt Ounce, a Penny for the ſecond, 4*d*. for the third, *&c*. in quadruple Proportion Geometrical; I demand what he ſold the Whole for, alſo how much he gained by the Sale thereof, ſuppoſing he gave for it 4*l*. *per* Ounce?

Anſw. { He ſold it for 5825*l*. 8*s*. 5*d*. 1*qr*.
{ And gained 5777*l*. 8*s*. 5*d*. 1*qr*.

5. A crafty Servant agreed with a Farmer (ignorant in Numbers) to ſerve him 12 Years, and to have nothing for his Service but the Produce of a Wheat-Corn for the firſt Year; and that Product to be ſowed the ſecond Year; and ſo on from Year to Year, until the End of the ſaid Time; I demand the Worth of the whole Produce, ſuppoſing the Increaſe to be but in a tenfold Proportion, and ſold out at 4*s*. *per* Buſhel? *Anſw*. 452112*l*. 4*s*. *rejecting Remainders*.

Note, 1. 7680 *Wheat or Barly-corns are ſuppoſed to make a Pint, and* 64 *Pints a Buſhel*.

2. *If the* firſt Term *in any* Series, *be either* greater *or* leſs *than the* Ratio (except Unity) *then multiply any two* Terms *together, and their* Product *divide by the* firſt Term, *that* Quotient *will exactly correſpond with the* Sum *of their* Indices, *as in the following*.

EXAMPLES.

6. A Threſher worked 20 Days at a Farmer's and receiv'd for the firſt Day's Work, 4 Barly-corns, for the ſecond, 12 Barly-corns, for the third, 36 Barly-corns, and ſo on in triple Proportion Geometrical; I demand what the 20 Days Labour came to, ſuppoſing the whole Quantity to be ſold for 2*s*. 6*d*. *per* Buſhel? *Anſw.* 1773*l*. 7*s* 6*d*. *rejecting Remainders*.

7. A Merchant ſold 30 Yards of fine Velvet, trimmed with Gold very curiouſly, at 2 Pins for the firſt Yard, 6 Pins for the ſecond 18 Pins for the third, *&c*. in triple Proportion Geometrical; I demand how much the Velvet produced, when the Pins were afterwards ſold at an hundred for a Farthing, alſo whether the ſaid Merchant gained or loſt by the Sale thereof, and how much, ſuppoſing the ſaid Velvet to have been bought at 50*l*. *per* Yard?

Anſw. { The Velvet produced 2144699292*l*. 13*s*. 0*d* ½
{ The Merchant gained 2144697792 13 0 ½.

Of

Of *PERMUTATION.*

Q. *What is* Permutation?

A. Changing the Order of Things.

Q. *How do you find all the* Variations *any Number of* Thing *are capable of going through?*

A Multiply all the given *Terms* one into another continually, the laſt *Product* is the Number of *Changes* required.

EXAMPLES.

1. I demand how many Changes may be rung upon twelve Bells, and alſo how long they would be in ringing but once over ſuppoſing 24 Changes might be rung in one Minute, and the Year to contain 365 Days, 6 Hours? *Anſw.* 37 *Years*, 49 *Weeks*, 3 *Days*, 6 *Hours.*

2. Seven Gentlemen that were travelling, met together by chance at a certain Inn upon the Road, where they were ſo well pleaſed with their Hoſt, and each others Company, that in a Frolic they offered him 30*l.* to ſtay at that Place ſo long as they, together with him, could ſit every Day at Dinner in a different Order. The Hoſt thinking they could not ſit in many different Poſitions, becauſe there were but a few of them, and that himſelf would make no conſiderable Alteration he being but one, imagin'd that he ſhould make a good Bargain, and readily (for the ſake of a good Dinner and better Company) entered into an Agreement with them, and ſo made himſelf the eight Perſon; I demand how long they ſtay'd at the ſaid Inn, and how many different Poſitions they ſat in? *Anſw. The Number of Poſitions were* 40320, *and the Time that they ſtay'd was* 110 *Years, and* 142 *Days; allowing the Year to conſiſt of* 365 *Days*, 6 *Hours.*

THE

The School-maſter's Aſſiſtant.

PART II.

Of VULGAR FRACTIONS.

Of Fractions in general.

Q. W*HAT is a* Fraction?

A. It is a broken Number, and ſignifies the Part r Parts of a whole Number.

Q. *How many kinds of* Fractions *are there?*

A. Two: *Vulgar* and *Decimal*.

Of Notation *of* Vulgar Fractions.

Q. *What is a* Vulgar Fraction?

A. Any two Numbers placed thus $\frac{7}{8}$, make a *Vulgar Fraction*,

Q. *What is the upper Number of a* Fraction *called?*

A. It is called *Numerator*, and is the Remainder after Diviſion

Q. *What is the lower Number called?*

A. It is called *Denominator*, and notes any Whole divided nto Parts; and is the Diviſor in Diviſion.

Q. *How many ſorts of* Vulgar Fractions *are there?*

A. Three: *Proper*, *Improper*, and *Compound*.

Q. *What is a* proper Fraction?

A. When the *Numerator* is leſs than the *Denominator*, as $\frac{7}{8}$

Q. *How far may a* proper Fraction *be expreſs'd?*

A. Without End, as $\frac{1}{2}$ may be called $\frac{2}{4}$ or $\frac{3}{6}$ or $\frac{4}{8}$, &c. but the loweſt Term $\frac{1}{2}$ is always deſired.

Q. *What is an* improper Fraction?

A. When the *Numerator* is greater than the *Denominator*, as $\frac{8}{7}$.

Q. *What is a* compound Fraction?

A. It is the Fraction of a Fraction, as $\frac{1}{2}$ of $\frac{2}{3}$, &c.

Of

Of REDUCTION *of* VULGAR FRACTIONS.

CASE 1.

Q. *How are* Vulgar Fractions *reduced to a* common Denominator?

A. 1. Multiply each *Numerator* into all the *Denominato* but its own, for a new *Numerator.*

2. Multiply all the *Denominators* for a *common Denominat*

EXAMPLES.

1. Reduce $\frac{3}{5}$ and $\frac{2}{3}$ to a common Denominator. *Facit* and $\frac{10}{15}$.

2. Reduce $\frac{7}{8}$, $\frac{9}{10}$, and $\frac{11}{12}$ to a common Denominato *Facit* $\frac{840}{960}$, $\frac{864}{960}$, $\frac{880}{960}$.

3. Reduce $\frac{6}{10}$, $\frac{4}{8}$, $\frac{1}{9}$, and $\frac{6}{7}$ to a common Denominato *Facit* $\frac{3024}{5040}$, $\frac{2520}{5040}$, $\frac{560}{5040}$, and $\frac{4320}{5040}$.

4. Reduce $\frac{4}{9}$, $\frac{7}{11}$, $\frac{6}{7}$, and $\frac{1}{2}$ to a common Denominato *Facit* $\frac{616}{1386}$, $\frac{882}{1386}$, $\frac{1188}{1386}$, and $\frac{693}{1386}$.

5. Reduce $\frac{6}{9}$, $\frac{2}{7}$, $\frac{1}{3}$, and $\frac{7}{8}$ to a common Denominato *Facit* $\frac{1008}{1512}$, $\frac{432}{1512}$, $\frac{504}{1512}$, and $\frac{1323}{1512}$.

6. Reduce $\frac{4}{5}$, $\frac{1}{2}$, $\frac{5}{6}$, and $\frac{3}{8}$ to a common Denominato *Facit* $\frac{384}{480}$, $\frac{240}{480}$, $\frac{400}{480}$, and $\frac{120}{480}$.

7. Reduce $\frac{2}{3}$, $\frac{5}{6}$, $\frac{7}{8}$, and $\frac{6}{7}$ to a common Denominato *Facit* $\frac{672}{1008}$, $\frac{480}{1008}$ $\frac{882}{1008}$ and $\frac{864}{1008}$.

CASE 2.

Q. *How do you reduce a* Vulgar Fraction *to its loweſt* Term

A. 1. Find a *common Meaſure* by dividing the lower *Ter* by the upper, and that *Diviſor* by the *Remainder* following till nothing remain: The laſt *Diviſor* is the *common Meaſur*

2. Divide both Parts of the *Fraction* by the *common Meaſure*, and the *Quotient* will make the *Fraction* required.

Note 1. *If the* common Meaſure *happen to be* 1, *the giv* Fraction *is already in its loweſt* Term.

2. *When a* Fraction *hath* Cyphers *at the Right Hand, it ma be abbreviated by cutting them off, thus,* $\frac{7|0}{9|0}$.

3. *This* Caſe *will prove* Caſe 1.

EXAMPLES.

1. Reduce $\frac{48}{56}$ to its loweſt Term. *Facit* $\frac{6}{7}$.
2. Reduce $\frac{72}{94}$ to its loweſt Term. *Facit* $\frac{36}{47}$.
3. Reduce $\frac{84}{170}$ to its loweſt Term. *Facit* $\frac{42}{85}$.
4. Reduce $\frac{60}{123}$ to its loweſt Term. *Facit* $\frac{20}{41}$.
5. Reduce $\frac{182}{196}$ to its loweſt Term. *Facit* $\frac{13}{14}$.
6. Reduſe $\frac{468}{1184}$ to its loweſt Term. *Facit* $\frac{117}{296}$.

CASE 3.

Q. *How is a* mixt Number *reduced to an* improper Fraction?

A. Multiply the *whole Number* into the *Denominator* o the *Fraction.*

2. To the *Product*, add the *Numerator* for a new *Numerator.*
3. Let its *Denominator* be the *Denominator* given.

Note, *To expreſs a* whole Number *Fraction-wiſe, put* 1 *for its* Denominator.

EXAMPLES.

1. Reduce $12\frac{15}{17}$ to an improper Fraction. *Facit* $\frac{219}{17}$.
2. Reduce $19\frac{12}{18}$ to an improper Fraction. *Facit* $\frac{354}{18}$.
3. Reduce $16\frac{18}{100}$ to an improper Fraction. *Facit* $\frac{1618}{100}$.
4. Reduce $12\frac{18}{58}$ to an improper Fraction. *Facit* $\frac{998}{58}$.
5. Reduce $100\frac{19}{59}$ to an improper Fraction. *Facit* $\frac{5019}{59}$.
6. Reduce $79\frac{12}{19}$ to an improper Fraction. *Facit* $\frac{1513}{19}$.

CASE 4.

Q. *How is an* improper Fraction *reduced to its proper* Terms?

A Divide the *upper Term* by the *lower.*

Note, *This* Caſe *and* Caſe 3 *prove each other.*

EXAMPLES.

1. Reduce $\frac{219}{17}$ to its proper Terms. *Facit.* $12\frac{15}{17}$.
2. Reduce $\frac{141}{17}$ to its proper Terms. *Facit.* $8\frac{5}{17}$.
3. Reduce $\frac{126}{48}$ to its proper Terms. *Facit.* $2\frac{30}{48}$.
4. Reduce $\frac{961}{17}$ to its proper Terms. *Facit.* $56\frac{9}{17}$.
5. Reduce $\frac{13}{7}$ to its proper Terms. *Facit.* $1\frac{6}{7}$.
6. Reduce $\frac{24}{7}$ to its proper Terms. *Facit.* $3\frac{3}{7}$.

CASE 5.

Q. *How do you reduce a* compound Fraction *to a* ſingle one?

A. 1. Multiply all the *Numerators* for a new *Numerator.*

2. Multiply all the *Denominators* for a new *Denominator.*

EXAMPLES.

1. Reduce $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$ to a ſingle Fraction *Facit.* $\frac{6}{24}$.
2. Reduce $\frac{7}{8}$ of $\frac{4}{6}$ of $\frac{9}{10}$ to a ſingle Fraction. *Facit.* $\frac{252}{480}$.
3. Reduce $\frac{12}{17}$ of $\frac{5}{6}$ of $\frac{1}{2}$ to a ſingle Fraction. *Facit.* $\frac{60}{178}$.
4. Reduce $\frac{5}{9}$ of $\frac{4}{8}$ of $\frac{3}{4}$ to a ſingle Fraction. *Facit.* $\frac{60}{288}$.
5. Reduce $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{4}{5}$ to a ſingle Fraction. *Facit.* $\frac{24}{60}$.
6. Reduce $\frac{1}{2}$ of $\frac{8}{9}$ of $\frac{6}{7}$ to a ſingle Fraction. *Facit.* $\frac{48}{126}$.

CASE 6.

Q. *How do you reduce the* Fraction *of any* Denomination *to the* Fraction *of another* Denomination, *but greater, retaining the ſame Value?*

A. 1. Reduce the given Fraction to a compound Fraction, by comparing it with all the *Denominations* between it, and that *Denomination*, which you would reduce it to.

2. Reduce that *compound Fraction* to a *ſimple* one, by *Caſe* 5.

EXAMPLES.

1. Reduce $\frac{5}{6}$ of a Penny to the Fraction of a Pound. *Facit* $\frac{5}{1440}$*l.*

2. Reduce $\frac{1}{2}$ of a Farthing to the Fraction of a Shilling. *Facit* $\frac{1}{96}$*s.*

3. Reduce $\frac{8}{9}$ of an Ounce Troy to the Fraction of a Pound. *Facit* $\frac{8}{108}$ ℔.

4. Reduce $\frac{5}{7}$ of a Pound Avoirdupois to the Fraction of a *Cwt.* *Facit* $\frac{5}{784}$ *Cwt.*

5. Reduce $\frac{9}{13}$ of a Pint of Wine to the Fraction of a Hhd. *Facit* $\frac{9}{6552}$. Hhd.

CASE 7.

Q. *How do you reduce the* vulgar Fraction *of any* Denomination *to the* vulgar Fraction *of another* Denomination, *but leſs, retaining the ſame Value?*

A. Multiply the given *Numerator* by the *Parts* of the *Denominations* between it, and that *Denomination* you would reduce the *Fractions* to for a new *Numerator*, and place it over the given *Denominator*.

Note, *This* Caſe *and* Caſe 6 *prove each other.*

EXAMPLES.

1. Reduce $\frac{5}{1440}$ of a Pound to the Fraction of a Penny. *Facit* $\frac{1200}{1440}=\frac{5}{6}$*d.*

2. Reduce $\frac{1}{96}$ of a Shilling to the Fraction of a Farthing. *Facit* $\frac{1}{2}$*qr.*

3. Reduce $\frac{8}{108}$ of a ℔ Troy to the Fraction of an Ounce. *Facit* $\frac{8}{9}$*oz.*

4. Reduce $\frac{5}{784}$ of a *Cwt.* to the Fraction of a Pound. *Facit* $\frac{5}{7}$ ℔.

5. Reduce $\frac{9}{6552}$ of a Hhd. of Wine to the Fraction of a Pint. *Facit* $\frac{9}{13}$ *Pint.*

CASE 8.

Q. *How do you reduce* vulgar Fractions *from one* Denomination *to another of the ſame Value, having the* Numerator *of the required* Fraction *given ?*

A. As the *Numerator* of the given *Fraction*
Is to its *Denominator* :
So is the *Numerator* of the intended *Fraction*
To its *Denominator*.

EXAMPLES.

1. Reduce $\frac{3}{4}$ to a Fraction of the ſame Value, whoſe Numerator ſhall be 15. *Facit* $\frac{15}{20}=\frac{3}{4}$.

2. Reduce $\frac{7}{8}$ to a Fraction of the ſame Value, whoſe Numerator ſhall be 42. *Facit* $\frac{42}{48}$.

3. Reduce $\frac{3}{4}$ to a Fraction of the ſame Value, whoſe Numerator ſhall be 34. *Facit* $\frac{34}{45}\ \frac{1}{3}$.

4. Reduce $\frac{5}{9}$ to a Fraction of the ſame Value, whoſe Numerator ſhall be 73. *Facit* $\frac{73}{131}\ \frac{2}{5}$.

Note, *From* Caſes 8 *and* 9 *there ariſes a* new Fraction, *which may not improperly be called a* mixt Fraction.

CASE 9.

Q. *How do you reduce* vulgar Fractions *from one* Denomination *to another of the ſame Value, having the* Denominator *of the* required Fraction *given ?*

A. As the *Denominator* of the given *Fraction*
Is to its *Numerator* :
So is the *Denominator* of the intended *Fraction*
To its *Numerator*.

Note, *This* Caſe *and* Caſe 8 *prove each other.*

EXAMPLES.

1. Reduce $\frac{3}{4}$ to a Fraction of the ſame Value, whoſe Denominator ſhall be 20. *Facit* $\frac{15}{20}=\frac{3}{4}$.

2. Reduce $\frac{7}{8}$ to a Fraction of the ſame Value, whoſe Denominator ſhall be 49. *Facit* $\frac{42}{49}\ \frac{7}{8}$.

3. Reduce $\frac{3}{4}$ to a Fraction of the ſame Value whoſe Denominator ſhall be 46. *Facit* $\frac{34}{46}\ \frac{2}{4}$.

4. Reduce $\frac{5}{9}$ to a Fraction of the ſame Value whoſe Denominator ſhall be 131 $\frac{2}{5}$. *Facit.* $\frac{73}{131}$,

CASE 10.

Q. *How is a* mixt Fraction *reduced to a* ſimple *one?*

A. 1. When the *Numerator* of the *Fraction* is the *integral* Part; then

(1.) Multiply it by the *Denominator* of the *fractional* Part, and to that *Product* add the *Numerator* of the *fractional* Part, for a new *Numerator.*

2. Multiply the *Denominator* of the *Fraction* by the *Denominator of the fractional* Part of the *Numerator,* for a new *Denominator.*

Note, *This proves* Caſe 9.

EXAMPLES.

1. Reduce $\frac{4}{4}\frac{2}{9}$ $\frac{7}{8}$ to a ſimple Fraction. *Facit* $\frac{7}{8}$.
2. Reduce $\frac{3}{4}\frac{4}{6}$ $\frac{1}{2}$ to a ſimple Fraction. *Facit* $\frac{4}{4}$.
3. Reduce $\frac{3}{4}\frac{7}{3}$ $\frac{4}{9}$ to a ſimple Fraction. *Facit* $\frac{1}{3}\frac{5}{6}\frac{7}{7}$.

2. When the *Denominator* of the *Fraction* is the *integral* Part; then

(1.) Multiply it by the *Denominator,* of the *fractional* Part, and to that *Product* add the *Numerator* of the *fractional* Part, for a new *Denominator.*

(1.) Multiply the *Numerator* of the *Fraction* by the *Denominator* of the *fractional* Part, for a new *Numerator.*

Note, *This proves* Caſe 8.

EXAMPLES.

1. Reduce $\frac{7}{1}\frac{3}{3}{}_{1}$ $\frac{2}{7}$ to a ſimple Fraction. *Facit* $\frac{3}{8}\frac{6}{7}\frac{5}{7}=\frac{5}{9}$.
2. Reduce $\frac{4}{7}\frac{1}{3}$ $\frac{1}{4}$ to a ſimple Fraction. *Facit* $\frac{1}{2}\frac{6}{9}\frac{4}{3}$.
3. Reduce $\frac{7}{19}$ $\frac{4}{5}$ to a ſimple Fraction. *Facit* $\frac{4}{9}\frac{5}{5}$.

CASE 11.

Q. *How do you find the* proper Quantity *of a* Fraction *in the known Parts of an* Integer?

A. Multiply the *Numerator* by the common Parts of the *Integer,* and divide by the *Denominator.*

EXAMPLES.

1. Reduce $\frac{2}{3}$ of a Pound Sterling to its proper Quantity. *Facit* 13*s.* 4*d.*

2. Reduce $\frac{1}{4}\frac{8}{3}$ of a Shilling to its proper Quantity. *Facit* 5*d.*$\frac{1}{3}$.

5. Reduce $\frac{6}{7}$ of 5*l.* 9*s.* to its proper Quantity. *Facit* 4*l.* 13*s.* 5*d.* $\frac{1}{7}$.

4. Reduce $\frac{1}{2}\frac{2}{6}$ of a ℔ Troy to its proper Quantity. *Facit* 9*oz.*

5. Reduce $\frac{2}{13}$ of a Tun Weight to its proper Quantity. *Facit* 3*C.* 0*qrs.* 8℔ 9*oz.* 13*dr.* $\frac{7}{13}$.

6. Reduce $\frac{5}{9}$ of a ℔ Avoirdupois to its proper Quantity. *Facit* 8*oz.* 14*dr.* $\frac{2}{9}$.

7. Reduce $\frac{9}{11}$ of 10*C.* 1*qr.* 12℔ to its proper Quantity *Facit* 8*C.* 1*qr.* 25℔ 1*oz.* 7*dr.* $\frac{3}{11}$.

8, Reduce $\frac{4}{7}$ of a Mile to its proper Quantity. *Facit* 4 *furlongs,* 125 *yds.* 2 *feet* 1 *in.* 2*bc.* $\frac{1}{7}$. *Iriſh* 4 *furlongs* 160 *yds.*

9. Reduce $\frac{9}{10}$ of a Yard to its proper Quantity. *Facit* 2 *feet* 8 *in.* 1 *bc.* $\frac{2}{10}$.

10. Reduce $\frac{4}{5}$ of an Ell *Engliſh* to its proper Quantity. *Facit* 1 *Yard.*

11. Reduce $\frac{7}{16}$ of an Acre to its proper Quantity. *Facit* 1 *Rood* 30 *Perches.*

12. Reduce $\frac{4}{9}$ of a Tun of Wine to its proper Quantity. *Facit* 1 *Hhd.* 49 *gal.*

13. Reduce $\frac{7}{8}$ of a Barrel of Beer to its proper Quantity. *Facit* 31 *gal.* $\frac{1}{2}$. *Iriſh* 35 *gal.*

14. Reduce $\frac{3}{8}$ of a Chaldron of Coals to its proper Quantity. *Facit* 13 *buſh.* $\frac{1}{2}$.

15. Reduce $\frac{2}{7}$ of a Quarter of Corn to its proper Quantity. *Facit* 2 *buſh.* 1 *peck* $\frac{1}{7}$.

16. Reduce $\frac{7}{13}$ of a Day natural to its proper Quantity. *Facit* 12 *hrs.* 55 *min.* 23 *ſec.* $\frac{1}{13}$.

17. Reduce $\frac{4}{5}$ of a Month to its proper Quantity. *Facit* 3 *wks.* 1 *day,* 9 *hrs.* 36 *min.*

18. What is the proper Quantity of $\frac{7}{8}$ of a Yard of Cloth? *Anſw.* 3*qrs.* 2*na.*

19. What is the proper Quantity of $\frac{2}{9}$ of a Hhd. of Beer? *Anſw.* 12 *gal.*

20. What is the proper Quantity of $\frac{3}{16}$ of a Barrel of Ale? *Anſw.* 6 *gal.* *Iriſh* 7$\frac{1}{2}$ *gal.*

CASE 12.

Q. *How do you reduce any given* Quantity *to the* Fraction *of any greater Denomination of the ſame kind?*

A. 1. Reduce the given Quantity to the loweſt Term mentioned for a *Numerator.*

2. Reduce the *Integral* Part to the ſame Term for a *Denominator,* and that will be the *Fraction* required.

Note 1. *If there be a* Fraction *given with the ſaid* Quantity, *let it be put to the* Numerator *of the* Fraction *required.*

2. Caſes 11 *and* 12 *prove each other.*

EXAMPLES.

1. Reduce 13*s.* 4*d.* to the Fraction of a Pound Sterling *Facit* $\frac{160}{240}=\frac{2}{3}$*l.*

2. Reduce 5*d.* $\frac{1}{43}$ to the Fraction of a Shilling. *Facit* $\frac{15}{43}$*s.*

3. What Part of 5*l.* 9*s.* is 4*l.* 13*s.* 5*d.* $\frac{1}{7}$? *Anſw.* $\frac{6}{7}$.

4. Reduce 9*oz.* Troy to the Fraction of a ℔. *Facit* $\frac{9}{12}$*s.* $=\frac{3}{4}$lb.

5. Reduce 3*C.* 0*qrs.* 8℔ 9*oz.* 13*dr.* $\frac{42}{78}$ to the Fraction of a Tun. *Facit* $\frac{12}{78}$ *Tun.*

6. Reduce 8*oz.* 14*dr.* $\frac{2}{9}$ to the Fraction of a ℔ Avoirdupois. *Facit* $\frac{5}{9}$ ℔.

7. What Part of 10*C.* 1*qr.* 12℔ is 8*C.* 1*qr.* 25℔ 1*oz.* 7*dr.* $\frac{3}{11}$? *Anſw* $\frac{9}{11}$.

8. Reduce 4 *fur.* 125*yds.* 2 *feet*, 1*in.* 2*bc.* $\frac{1}{7}$ to the Fraction of a Mile. *Facit* $\frac{4}{7}$ *Mile.*

9. Reduce 2 *feet*, 8*in.* 1*bc.* $\frac{2}{10}$ of the Fraction of a Yard. *Facit* $\frac{9}{10}$ *Yard.*

10. Reduce 1 Yard to the Fraction of an Ell. *Facit* $\frac{4}{5}$ *Ell.*

11. Reduce 1 Rood 30 Poles to the Fraction of an Acre *Facit* $\frac{7}{16}$ *acre.*

12. Reduce 1 Hhd. 49 Gal. of Wine to the Fraction of a Tun. *Facit.* $\frac{4}{9}$ *Tun*

13. Reduce 31 Gal $\frac{1}{2}$ of Beer to the Fraction of a Barrel. *Facit* $\frac{7}{8}$ *Barrel. Iriſh* $\frac{63}{68}$ *Bar.*

14. Reduce 13 Buſh. $\frac{1}{2}$ to the Fraction of a Chaldron. *Facit* $\frac{3}{8}$ *Chaldron.*

15. Reduce 2 Buſh. 1 Peck $\frac{1}{7}$ of Corn to the Fraction of a Quarter. *Facit* $\frac{2}{7}$ *Quarter.*

16. Reduce 12 Hrs 55 min. 23 ſec. $\frac{1}{13}$ to the Fraction of a Day natural. *Facit* $\frac{7}{13}$ *Day.*

17. Reduce 3 w. 1d. 9*h.* 36m. to the Fraction of a Month. *Facit* $\frac{4}{5}$ *Month.*

18. Reduce 3 Qrs. 2 Nails to the Fraction of a Yard. *Facit* $\frac{7}{8}$ *Yard.*

19. Reduce 12 Gal. of Beer to the Fraction of a Hogſhead. *Facit* $\frac{4}{18}$ *hhd.*

20. Reduce 6 Gallons of Ale to the Fraction of a Barrel. *Facit* $\frac{3}{16}$ *Barrel. Iriſh* $\frac{3}{20}$ *Barrel.*

21. Reduce 13 Hours 30 min. to the Fraction of a Day *Facit* $\frac{810}{1440}=\frac{9}{16}$.

Of ADDITION *of* VULGAR FRACTIONS.

Q. *How are* Vulgar Fractions *added together ?*

A. 1. Reduce the given *Fractions* to a common *Denominator.*

2. Add all the *Numerators* together for a new *Numerator* ; under which ſubſcribe the common *Denominator.*

Note, *This* Rule *is proved by* Subtraction, *when two* Fractions *only are given.*

EXAMPLES.

1. Add $\frac{1}{2}$ and $\frac{7}{8}$ together. - - - - - - - - - - *Facit* $1\frac{6}{16}$.
2. Add $\frac{7}{10}$ and $\frac{11}{12}$ and $\frac{4}{9}$ together. - - - *Facit* $2\frac{66}{1080}$.
3. Add 19 and $7\frac{1}{2}$ of $2\frac{2}{3}$ together. - - - - - *Facit* $26\frac{8}{6}$.
4. Add $\frac{1}{2}$ of $\frac{7}{8}$ and $\frac{2}{3}$ of $\frac{19}{20}$ together. - - *Facit* $1\frac{69}{960}$.
5. Add $\frac{1}{3}$ of 95 and $\frac{7}{8}$ of 14 together. - *Facit* $43\frac{22}{24}$.
6. Add $\frac{2}{3}$ and $17\frac{1}{2}$ together. - - - - - - - - *Facit* $18\frac{1}{6}$.
7. Add $12\frac{1}{2}$ and $3\frac{2}{3}$ and $4\frac{3}{4}$ together. - - *Facit* $20\frac{22}{24}$.
8. Add $6\frac{7}{8}$ of $\frac{9}{10}$ and $\frac{4}{7}$ of $\frac{1}{2}$ and $7\frac{1}{2}$ together. *Facit* $14\frac{1284}{2240}$.

Note, *In order to find the following* Facits, *the* Fractions *given muſt be reduced to their* proper Quantities *by* Caſe 6, *in* Reduction ; *and then added, as in* Addition *of* whole Numbers.

9. Add $\frac{7}{8}$ of a Pound to $\frac{3}{4}$ of a Shilling. *Facit* 18*s.* 3*d.*

10 Add $\frac{3}{4}$ of a Penny to $\frac{1}{9}$ of a Pound *Facit* 2*s.* 3*d.* 1*qr.*$\frac{5}{9}$.

11. Add $\frac{1}{2}$ of a Pound Troy to $\frac{7}{12}$ of an Ounce. *Facit* 6*oz.* 11*dwts.* 16*gr.*

12. Add $\frac{4}{7}$ of a Tun to $\frac{9}{10}$ of an *Cwt.* *Facit* 12 *C.* 1*qr.* 8lb 12*oz.* 12*dr.* $\frac{9}{10}$.

13 Add $\frac{3}{4}$ of a Mile to $\frac{7}{10}$ of a Furlong. *Facit* 6 *fur.* 28 *poles.*

14 Add $\frac{1}{2}$ of a Yard to $\frac{2}{3}$ of a Foot. *Facit* 2 *feet,* 2 *in.*

15. Add $\frac{1}{3}$ of a Day to $\frac{1}{2}$ of an Hour. *Facit* 8*hrs.* 30 *min.*

16. Add $\frac{4}{9}$ of a Chaldron to $\frac{7}{8}$ of a Buſhel. *Facit* 16 *buſh.* 3 *Pecks* $\frac{1}{2}$.

17. Add $\frac{1}{3}$ of a Week, $\frac{1}{4}$ of a Day, and $\frac{1}{2}$ of an Hour together. *Facit* 2 *days,* 14*hrs.* $\frac{1}{2}$.

18. Add $\frac{2}{3}$ of a Yard, $\frac{3}{4}$ of a Foot, and $\frac{7}{8}$ of a Mile together. *Facit* 1540*yds.* 2 *feet,* 9*in.* *Iriſh* 1960*yds.* 2 *feet.* 9*in.*

SUBTRACTION *of* VULGAR FRACTIONS.

Q. *How are* Vulgar Fractions *ſubtracted?*

A. 1. Reduce the given *Fractions* to a common *Denominator*.

2. *Subtract* the leſſer *Numerator* from the greater, and place it over the common *Denominator*.

3. When the lower *Fraction* is greater than the upper, ſubtract the *Numerator* of the lower *Fraction* from the *Denominator*, and to that Difference add the upper *Numerator*, carrying *one* to the Units Place of the lower whole Number.

Note, *This Rule is proved by* Addition.

EXAMPLES.

1. From $\frac{111}{112}$ take $\frac{3}{4}$. - - - - - - - *Facit* $\frac{108}{448}$.
2. From $\frac{97}{100}$ take $\frac{1}{7}$. - - - - - - - *Facit* $\frac{579}{700}$.
3. From 96$\frac{1}{3}$ take 14$\frac{3}{7}$ - - - - - - - *Facit* 81$\frac{19}{21}$.
4. From 96 take $\frac{3}{5}$. - - - - - - - - - *Facit* 95$\frac{2}{5}$.
5. From $\frac{1}{3}$ of 76 take $\frac{3}{4}$ of 21 - - *Facit* 9$\frac{7}{12}$.
6. From $\frac{109}{110}$ take $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}$. - *Facit* $\frac{1956}{2640}$.
7. From 71$\frac{1}{2}$ take $\frac{17}{19}$ - - - - - - - - *Facit* 70$\frac{23}{38}$.
8. From 14$\frac{1}{4}$ take $\frac{2}{3}$ of 19 - - - *Facit* 1$\frac{7}{12}$.

Note, *In order to find the following* Facits, *the* Fractions *given muſt be reduced to their proper* Quantities by Caſe 6, *in* Reduction, *and then ſubtracted, as in* Subtraction *of* whole Numbers.

9. From $\frac{1}{2}$ of a Pound take $\frac{3}{4}$ of a Shilling. *Facit* 9*s*. 3*d*.

10. From $\frac{1}{2}$ of a Shilling take $\frac{3}{4}$ of a Penny. *Facit* 5*d*. $\frac{1}{4}$.

11. From $\frac{3}{5}$ of an *oz*. take $\frac{7}{8}$ of a *dwt*. *Facit* 11*dwt*. 3*gr*.

12. From $\frac{1}{2}$ of an *Cwt*. take $\frac{7}{12}$ of a Pound, *Facit* 1 *qr*. 27℔ 6*oz*. 10*dr*. $\frac{8}{12}$.

13. From $\frac{2}{3}$ of a Leagne take $\frac{7}{10}$ of a Mile. *Facit* 1 *mile*. 2 *fur*. 16 *poles*.

14. From 1 Ell take $\frac{7}{10}$ of a *qr*. *Facit* 1*yd*. 0*qr*. 1*na* $\frac{2}{10}$.

15. From $\frac{3}{14}$ of a *Hhd*. of Beer take one Gallon. *Facit* 12 *gal*. $\frac{1}{2}$.

16. From $\frac{4}{8}$ of a Chaldron take $\frac{2}{3}$ of a Buſhel. *Facit* 17 *buſh*. 1 *peck* $\frac{1}{3}$.

17. From 7 Weeks take 9 Days $\frac{7}{10}$. *Facit* 5 *weeks*, 4 *days* 7 *hours*. 12 *min*.

18. From 4 *days*, 7 *hrs*. $\frac{1}{2}$ take 1 *day*, 9*hrs*. $\frac{3}{8}$. *acit* 2 *days*, 22*hrs*. $\frac{1}{8}$.

Of MULTIPLICATION *of* VULGAR FRACTIONS.

Q. *How are* Vulgar Fractions *multiplied ?*

A. 1. Prepare the given Numbers (if need be) by the Rules of *Reduction.*

2. Multiply all the given *Numerators* for a new *Numerator,* and all the *Denominators* for a new *Denominator.*

Note, *When any* Number, *either* whole *or* mixt, *is multiplied by a* Fraction, *the* Product *is always* leſs *than the* Multiplicand, *in the ſame Proportion as the multiplying* Fraction *is* leſs *than* 1 *or an* Unit.

EXAMPLES.

1. Multiply $\frac{2}{7}$ by $\frac{3}{11}$. - - - - - *Facit* $\frac{6}{77}$.
2. Multiply $\frac{3}{8}$ by $\frac{7}{9}$. - - - - - - *Facit* $\frac{21}{72}$.
3. Multiply $\frac{1}{3}$ of $\frac{4}{7}$ by $\frac{7}{10}$ of $\frac{11}{12}$. *Facit* $\frac{308}{2520}$.
4. Multiply $7\frac{1}{4}$ by $8\frac{1}{2}$. - - - - - *Facit* $61\frac{5}{8}$.
5. Multiply $4\frac{1}{2}$ by $\frac{1}{8}$. - - - - - - *Facit* $\frac{9}{16}$.
6. Multiply $\frac{7}{8}$ by $13\frac{9}{10}$. - - - - - *Facit* $12\frac{13}{80}$.
7. Multiply $\frac{1}{2}$ of 7 by $\frac{3}{6}$. - - - - *Facit* $1\frac{9}{12}$.
8. Multiply $\frac{3}{5}$ of 8 by $\frac{7}{8}$ of 5. - *Facit* 21.
9. Multiply $\frac{3}{6}$ by $\frac{4}{9}$ of 11. - - - *Facit* $2\frac{24}{54}$.
10. Multiply $\frac{4}{5}$ of 91 by $71\frac{1}{2}$. - *Facit* $5205\frac{2}{10}$.
11. Multiply $12\frac{3}{5}$ by $\frac{2}{6}$ of 7. - - *Facit* $29\frac{12}{30}$.
12. Multiply $7\frac{1}{2}$ by $9\frac{1}{4}$. - - - - - *Facit* $69\frac{3}{8}$.

Of DIVISION *of* VULGAR FRACTIONS.

Q. *How are* Vulgar Fractions *divided ?*

A. 1. Prepare the Numbers given (if need be) by the Rules of *Reduction.*

2. Multiply the *Denominator* of the *Diviſor* into the *Numerator* of the *Dividend,* for a new *Numerator* ; and the *Numerator* of the *Diviſor* into the *Denominator* of the *Dividend,* for a new *Denominator.*

Note 1. *When the* Dividend *is greater than the* Diviſor, *the* Quotient *will be greater than the* Dividend : *But when the* Dividend *is leſs than the* Diviſor, *then the* Quotient *will be leſs than the* Dividend, *and in the ſame Proportion as an* Unit *is greater or leſs than the Dividing* Fractions.

2. Multiplication *and* Diviſion *prove each other.*

Examples.

EXAMPLES.

1. Divide $\frac{17}{21}$ by $\frac{3}{4}$. - - - *Facit* $1\frac{5}{63}$.
2. Divide $\frac{12}{19}$ by $\frac{7}{9}$. - - - *Facit* $\frac{108}{133}$.
3. Divide $\frac{14}{15}$ by $\frac{7}{10}$. - - *Facit* $1\frac{14}{162}$.
4. Divide $1\frac{1}{2}$ by $4\frac{8}{10}$. - *Facit* $\frac{30}{97}$.
5. Divide $\frac{7}{8}$ by 4. - - - - *Facit* $\frac{7}{32}$.
6. Divide 4 by $\frac{7}{8}$. - - - *Facit* $4\frac{4}{7}$.
7. Divide 99 by 108. - *Facit* $\frac{99}{108}$.
8. Divide $\frac{1}{5}$ of 19by $\frac{2}{7}$of $\frac{3}{4}$.*Facit* $7\frac{18}{30}$.
9. Divide $\frac{1}{2}$ of $\frac{2}{3}$ by $\frac{2}{3}$ of$\frac{3}{4}$.*Facit* $\frac{24}{37}$.
10. Divide $\frac{2}{3}$ of $\frac{1}{4}$ by $\frac{1}{2}$ of $\frac{2}{3}$.*Facit* $1\frac{12}{24}$.
11. Divide $4\frac{5}{9}$ by $\frac{5}{9}$ of 4 *Facit* $2\frac{1}{20}$.
12. Divide $\frac{5}{9}$ of 4 by $4\frac{5}{9}$ - *Facit* $\frac{20}{41}$.

Of the SINGLE RULE *of* THREE DIRECT, *in* VULGAR FRACTIONS.

Q. *How is the* Rule *of* Three *in* Fractions *performed?*

A. The Operations of the *Rule* of *Three* in *Fractions,* both *Single* and *Double, Vulgar* and *Decimal,* are exactly agreeable to the Principals laid down in the *Rule* of *Three,* both *ſingle* and *double,* in whole Numbers.

Q. *How are the following* Examples *proved?*

A. By changing the Order of them.

EXAMPLES.

1. If $\frac{11}{13}$ of a ℔ of Sugar coſt $\frac{7}{11}$ of a Shilling what coſt $\frac{3}{4}\frac{2}{3}$ of a ℔? *Anſw.* $\frac{2512}{7095}$s.=4d 3*qrs.* $\frac{4575}{7095}$.

2. If $\frac{2}{7}$ of an Ell coſt $\frac{2}{3}$ of a Pound, what coſt $\frac{12}{17}$ of an Ell? *Anſw.* 15*s.* 8*d.* $\frac{36}{153}$.

3. If $\frac{4}{7}$ of an Ell coſt $\frac{7}{23}$ of 13 Pound, what coſt the whole Ell? *Anſw* 18*s.* 10*d.* $\frac{8}{52}$

4. If 2*oz.* of Silver coſt 16*s.* 5*d.* what coſt $\frac{3}{4}$ *oz?* *Anſw.* 6*s.* 1*d.* 3*qrs.* $\frac{1}{2}$

5. If 6 Yards $\frac{1}{2}$ coſt 18*s.* what coſt 9 Yards $\frac{1}{4}$? *Anſw.* 1*l.* 5*s.* 7*d.* 1*qr.* $\frac{7}{13}$.

6. If 1 Dollar be worth 56*d.* $\frac{3}{5}$, what is 500 Dollars worth *Anſw.* 117*l.* 18*s.* 4*d.*

7. If 1 Ell coſt 9*s.* what coſt 16 Yards $\frac{1}{4}$. *Anſw.* 5*l.* 17*s.*

8. If 1 Piſtole be worth 17*s.* $\frac{1}{5}$, what is the Value of 100 Piſtoles? *Anſw.* 86*l*

9. If $\frac{5}{7}$ *oz*. coſt $\frac{11}{12}$*l*. what coſt the whole Ounce? *Anſw*. 1*l*. 5*s*. 8*d*.

10. If an Ingot of Silver weighs 16 $\frac{11}{15}$*oz*. what is it worth at 5*s*. 6*d*. *per Oz*? *Anſw*. 4*l*. 12*s*. 0*d*. 1*qr*. $\frac{9}{15}$.

11. If $\frac{9}{10}$ *C*. coſt 14*l*. 4*s*. what will 7*C*. $\frac{1}{2}$ coſt? *Anſw*. 118*l*. 6*s*. 8*d*.

12. If $\frac{4}{5}$ of an Ell coſt $\frac{2}{3}$ of 19*l*. what coſt 7 Ells? *Anſw*. 7*l* 7*s*. 9*d*. 1*qr*. $\frac{2}{9}$.

13. If 8℔ of Tobacco coſt 4*s*. 9*d*. $\frac{2}{3}$, what coſt 1℔? *Anſw*. 7*d*. $\frac{1}{5}$.

14. If 1 Yd of Broad cloth coſt 15*s*. $\frac{5}{8}$, what will 4 Pieces, each containing 27 Yds. $\frac{3}{8}$ coſt? *Anſw*. 85*l*. 10*s*. 11*d*. $\frac{1}{4}$.

15. A Mercer bought 3 Pieces $\frac{1}{2}$ of Silk, each containing 24 Yards $\frac{1}{3}$, at 6*s*. 0*d*. $\frac{1}{2}$ *per* Yard; I demand the Value of the 3 Pieces $\frac{1}{2}$, at that Rate? *Anſw*. 25*l*. 14*s*. 6*d*. 2*qrs*. $\frac{4}{15}$

16. If $\frac{1}{3}$℔ leſs by $\frac{1}{8}$ coſt 13*d*. $\frac{1}{3}$ what coſt 14℔ leſs by $\frac{1}{3}$ of 2℔? *Anſw*. 4*l*. 9*s*. 9*d*. $\frac{3}{25}$.

17. A Merchant had 5*C*. $\frac{8}{9}$ of Sugar, at 6*d*. $\frac{3}{4}$ *per* ℔, which he would barter for Tea at 8*s*. $\frac{5}{8}$ *per* ℔; I demand how much Tea muſt be given for the Sugar? *Anſw*. 43℔ $\frac{6}{13}$.

18. Bought 120℔ of Tea at 8*s*. $\frac{5}{8}$ *per* ℔, and ſold it again for 70*l*. what was the Gain *per Cent*? *Anſw*. 35*l*. 5*s*. 3*d*. 3*qrs*. $\frac{15}{1035}$.

Of the SINGLE RULE *of* THREE INVERSE, *in* VULGAR FRACTIONS

1. If 3$\frac{1}{4}$ Yards of Cloth that is 1$\frac{1}{5}$ Yard wide be ſufficient to make a Cloak; how much muſt I have of that Sort which is $\frac{4}{5}$ Yard wide, to make a Cloak of the ſame Bigneſs. *Anſw*. 4$\frac{7}{8}$ *Yards*.

2. If 16 Men can finiſh a piece of Work in 28$\frac{1}{3}$ Days; how long will 12 Men require to do the ſame Work? *Anſw*. 37$\frac{28}{36}$. *Days*.

3. If 1$\frac{1}{4}$ Yard in Breadth require 20$\frac{1}{2}$ Yards long to make a Garment; what Length will $\frac{3}{4}$ Yard wide require to make the ſame? *Anſw*. 136$\frac{2}{3}$ *Yards*.

4. How many Pieces of Merchandize, at 20*s*. $\frac{1}{8}$ *per* Piece, are to be given for 240 $\frac{3}{7}$ Pieces at 12*s*. $\frac{1}{4}$ *per* Piece? *Anſw*. 104$\frac{1784}{2474}$.

5. How many Yards of Canvas, that is 1$\frac{1}{4}$ Yard wide, will be ſufficient to line 20 Yards of Say, that is $\frac{3}{4}$ Yard wide? *Anſw*. 12 *Yards of Canvas*.

Of

Of the DOUBLE RULE of THREE, in VULGAR FRACTIONS.

1. If 9 Students ſpend 10*l.* $\frac{7}{9}$ in 18 Days; how much will 20 Students ſpend in 30 Days? *Anſw.* 41*l.* 15*s.* 11*d.* $\frac{1}{2}$ +

2. Three Men having work'd 19$\frac{1}{2}$ Days, received 8*l.* $\frac{9}{10}$; how much muſt 20 Men have for 100$\frac{3}{4}$ Days? *Anſw.* 305*l.* 0*s.* 8*d.* +

3. A Man and his Wife having laboured 1 day, earned 4*s.* $\frac{5}{8}$; I demand how much they muſt have for 10 Days $\frac{1}{2}$, when their two Sons help them? *Anſw.* 4*l.* 17*s.* 1*d.* $\frac{1}{8}$

4. A Man with his Family, which in all were 5 Perſons, did uſually drink 7$\frac{4}{5}$ Gallons of Beer in a Week; how much will be drank in 22 Weeks $\frac{1}{2}$, when 3 Perſons more come into the Family? *Anſw.* 40$\frac{4}{5}$ *Gal.*

5. Seven Men with their Wives, upon examining into their Expences for 20 Weeks paſt, found that they had laid out 40*l.* $\frac{4}{5}$; I demand in what time 20*l.* $\frac{3}{5}$ may be ſpent by 46 Men in the like Proportion? *Anſw.* 3 *weeks* 1 *day* $\frac{14874}{55771}$.

6. Three Sailors having being abroad 9$\frac{1}{4}$ Months, received 40*l.* $\frac{3}{11}$; I demand how much 100 Sailors muſt receive for 28$\frac{1}{7}$ Months Service? *Anſw.* 4118*l.* 6*s.* 0*d.* $\frac{1}{4}$. +

THE

School-maſter's Aſſiſtant.

PART III.

Of DECIMAL FRACTIONS.

Q. WHAT *do you underſtand by* Decimals *in general?*

A. Any Thing which is called *One*; as one *Foot*, one *Pound*, one *Shilling*, one *Year*, &c is conceived in Imagination to be divided into *ten* equal *Parts*, and every one of thoſe Parts into *ten* other equal *Parts*; and ſo on by *Decimal* Diviſion without End.

Q. *What is a* Decimal Fraction?

A. Any Number having a Point placed before it, thus .641 is a Decimal.

Q. *How do you diſtinguiſh a* whole Number *from a* Decimal Fraction?

A. Any Number having a Point placed after it, thus 641. is a whole *Number*.

Q. *What is a* mixt Number?

A. Any Quantity of Figures having a Point placed ſomewhere between them, thus 6.41, is a mixt *Number*.

Note, *The* Decimal Point *muſt never be omitted*; *becauſe without it a* Decimal *cannot be diſtinguiſhed from a* whole *or* mixt Number.

Of NOTATION *of* DECIMALS.

Q. *How do* Decimal Places *increaſe?*

A. In the ſame manner as whole Numbers do; that is, by *Tens*, for every Place towards the left Hand is ten times greater than that which is next it towards the right Hand, as appears by the following *Table*.

TABLE.

C. Thouſands	*X. Thouſands*	*Thouſands*	*Hundreds*	*Tens*	*Units*	*Tenth Parts*	*Hundredth Parts*	*Thouſandth Parts*	*X. Thouſandth Parts*	*C. Thouſandth Parts*
6	5	4	3	2	1	.2	3	4	5	6

Q. *May not* Cyphers *ſometimes be annexed to* Decimals?

A. They may, but they alter not their Value: Thus .41 and .4100 are the ſame.

Q. *May not* Cyphers *ſometimes be prefixed to* Decimal Parts?

A. Yes; and then they decreaſe their Value, by removing them farther from the Point: Thus .0041 is leſs than .41.

Of ADDITION *and* SUBTRACTION *of* DECIMALS.

Q. HOW *are* Decimals *added or ſubtracted?*

A. Place the Numbers according to their Value, and work as in *Addition* and *Subtraction* of whole Numbers,

Q. *How are the Operations proved?*

A. As in whole Numbers.

EXAMPLES *in* ADDITION.

Shillings	*Yds.*	*Galls.*	*l.*
17.471	47.4	7004.16	71.001
1.191	19.71	712.712	120.07
1.8126	461.728	19.0174	31.121
3.6126	400.004	7.3126	13.4101
7.1281	7.1004	71.1851	76.04
18.8126	7.07	4.108	7.3

Miles	℔	*Acres*	*Ounces*
41.8102	86.18104	.61271	48.9108
140.037	3.14	.8712	1.8191
18.10	1.181	.012	3.1080
7.8141	7.7121	.87	.7012
16.4612	8.19817	.04	.0012
7.81	13.071	.4	.0018

EXAMPLES *in* SUBTRACTION.

	Years	*Days*	*Weeks*	*Hours*
From	1081.761	712.10009	127.19	12.
Take	10.00012	7.121	121.	.12

	Minutes	*Months*	*Ells*	*Tuns*
From	174.1	6100.	.172618	761.8109
Take	1.471	6.109	.0000148	18.9112

Of MULTIPLICATION *of* DECIMALS.

Q. HOW *are* Decimals *multiplied?*

A. As whole Numbers are.

Note 1. *When Numbers are multiplied, make as many* Decimal Places *in the* Product, *as there are in the two* Factors *taken together,*

2. *If* Decimal Places *are wanting in the* Product, *ſupply them with* Cyphers *to the* Decimal Point.

3. *Obſerve the ſame* Note *here, which is given in* Multiplication *of* Vulgar Fractions.

Q. *How are the ſollowing* Examples *proved?*

A. By inverting the *Factors.*

EXAMPLES.

1. Multiply .612 by 4.12
2. Multiply 48. by .48
3. Multiply 37.9 by 46.5
4. Multiply .121 by 17.2
5. Multiply 1.81 by 71.
6. Multiply 4.1 by 1.42
7. Multiply .00071 by .121
8. Multiply .00041 by .00017.
9. Multiply .0027 by 41.
10. Multiply 410. by .0012
11. Multiply .07 by 07.
12. Multiply 1.007 by .41
13. Multiply 4.001 by .004
14. Multiply .004 by .004

Of DIVISION *of* DECIMALS.

Q. HOW *are* Decimals *divided?*
A. As whole Numbers are.

Note 1. *The* Decimal Places *of the* Diviſor *and* Quotient *muſt always be equal to thoſe in the* Dividend.

2. *If there be more* Decimals *in the* Diviſor *than in the* Dividend, *annex as many* Cyphers *as you pleaſe to the* Dividend, *ſo as to be equal at leaſt to the* Diviſor.

3. *If* Decimal Places *are wanting in the* Quotient, *they muſt be ſupplied with* Cyphers *to the* Decimal Point.

4. *Obſerve the ſame* Note *here, which is given in* Diviſion *of* Vulgar Fractions.

Q. *How are the following* Examples *to be proved?*
A. By *Multiplication.*

EXAMPLES.

1. Divide 19.4 by 37.5
2. Divide 47121.1 by 47.
3. Divide 4.18 by .1812
4. Divide .76121 by 41.
5. Divide .6.2812 by 7.21
6. Divide .121819 by 721.
7. Divide 9. by .7121
8. Divide 9. by .9
9. Divide 14. by 47.31
10. Divide 1. by 863.
11. Divide .012181 by .12
12. Divide .0001212 by .018

Of REDUCTION *of* DECIMALS.

Q. HOW *do you reduce a* Vulgar Fraction *to a* Decimal?
A. Divide the *upper Term* by the *lower.*

Note, *Both* Terms *are to be eſteemed* whole Numbers.

EXAMPLES.

EXAMPLES.

1. Reduce $\frac{5}{26}$ to a Decimal. *Facit* .1923076+
2. Reduce $\frac{5}{28}$ to a Decimal. *Facit* .1785714+
3. Reduce $\frac{11}{14}$ of $\frac{10}{13}$ to a Decimal. *Facit* .6043956+
4. Reduce 7*s.* 6*d.* to the Decimal of a Pound. *Facit* .375*l.*
5. Reduce 10*s.* 9*d.* ¼ to the Decimal of a Pound. *Facit* .5385416+*l.*
6. Reduce 24 Grains to the Decimal of a ℔ Troy. *Facit* .0041666+℔.
7. Reduce 14 Drams to the Decimal of a ℔ Avoirdupois *Facit* .0546875℔.
8. Reduce 4*C.* 2*qrs.* to the Decimal of a Ton. *Facit* .225*Ton*
9. Reduce 14*C.* to the Decimal of a Ton. *Facit* .7 *Ton.*
10. Reduce 174 Drams to the Decimal of a *C.* *Facit* .0060686+*C.*
11. Reduce 4 Inches to the Decimal of a Yard. *Facit* .1111111+*Yard.*
12. Reduce 76 Yards to the Decimal of a Mile. *Facit* .4318181+*Mile.* Iriſh .03392857+*Mile.*
13. Reduce 1 Mile to the Decimal of a League. *Facit* .3333333+*League.*
14. Reduce 3*qrs.* 2*na.* to the Decimal of a Yard. *Facit* .875 *Yard.*
15. Reduce 4 Perches to the Decimal of an Acre. *Facit* .025 *Acre.*
16. Reduce 1 Pint to the Decimal of a Gallon. *Facit* .125 *Gallon.*
17. Reduce 1 Gallon of Wine to the Decimal of a Hhd. *Facit* .015873+*Hhd.*
18. Reduce 7 Minutes to the Decimal of a Day. *Facit* .0048611+*Day.*
19. Reduce 2 Days to the Decimal of a Week. *Facit* 2857102+*Week.*
20. Reduce 72 Days to the Decimal of a Year. *Facit* .1972602+*Year.*

CASE 2.

Q. *How do you find the* proper Quantity *of a* Decimal Fraction *in the known Parts of an* Integer?

A. Multiply it by the common Parts of the *Integer.*

Q. *How do you prove* Queſtions *in this* Caſe?

A. By *Caſe* 1.

EXAMPLES.

1. What is the proper Quantity of .76 of a Pound? *Anſw.* 15*s.* 2*d.* 1. 6*qr.*

2. What is the proper Quantity of .861 of a *Cwt?* *Anſw.* 3*qrs.* 12℔ 6*oz* 14.592*dr.*

3. What is the proper Quantity of .461 of a Shilling? *Anſw.* 5*d.* 2. 128*qrs.*

4. What is the proper Quantity of .761 of a Hhd. of Wine? *Anſw.* 47*gals.* 3*qts.* 1.544*pt.*

5. What is the proper Quantity of .17 of a Tun of Wine? *Anſw.* 52*gals.* 3.36*qts.*

6. What is the proper Quantity of .761 of a Day? *Anſw.* 18*hrs.* 15 *min.* 50.4 *ſec.*

7. What is the proper Quantity of .7 of a ℔ of Silver? *Anſw.* 8*oz.* 8*dwts.*

8. What is the proper Quantity of .71 of 4*oz* of Gold? *Anſw.* 2*oz.* 16*dwts* 19.2*gr.*

9. What is the proper Quantity of .67 of a League? *Anſw.* 2 *miles,* 0 *fur.* 3 *poles,* 1 *yd.* 0 *feet,* 3*in.* 1.8*bc.* Iriſh 2 *miles,* 0 *fur.* 3 *po.* 1 *yd.* 2 *inc.* &c.

10. What is the proper Quantity of 712 of a Furlong? *Anſw.* 28 *poles,* 2*yds.* 1 *foot,* 11.04 *in.* Iriſh 21 *poles,* 3 *yards,* 0 *feet,* 8.16*inches.*

11. What is the proper Quantity of .07 of a Barrel of Ale? *Anſw.* 2 *gal.* 1.92*pt.* Iriſh 2 *gal.* 1 *pot.* 1.20 *quarts.*

12. What is the proper Quantity of .4712 of an Ell *Eng.?* *Anſw.* 2*qrs.* 1.424*na.*

13. What is the proper Quantity of .72 of a Hhd. of Beer? *Anſw.* 38 *gals.* 3.52*qts.*

14. What is the proper Quantity of .61 of a Tun of Wine? *Anſw* 2*Hhds.* 27 *gals.* 2*qts.* 1.76*pt.*

15. What is the proper Quantity of .092 of 3 Acres, 2 Roods? *Anſw.* 1 *Rood,* 11.52*poles,*

16. What is the proper Quantity of 461 of a Chaldron of Coals? *Anſw.* 16 *buſh.* 2.384 *pecks.*

17. What is the proper Quantity of .712 of 3*qrs.* of Corn? *Anſw.* 17 *buſh.* 2.816*qts.*

18. What is the proper Quantity of .3 of a Year? *Anſw.* 109 *days.* 12 *hours.*

19. What is the proper Quantity of .5 of an Hour? *Anſw.* 30 *min.*

20. A certain Tenant hired a Horſe for 9 Years, at 12.4*l.* *per Annum*; how much was due at the End of the Term? *Anſw.* 111*l.* 12*s.*

Note, Addition *and* Subtraction *of* Decimals, *of different Denominations, may eaſily be performed, after the* Decimals *are reduced to their* proper Quantities.

EXAMPLES.

1. What is the Sum of .48*l.* and 16*s.* reduced to their proper Values? *Anſw.* 9*s.* 9.12*d.*

2. What is the Sum of 17℔ Troy, and .84*oz*? *Anſw.* 2*oz.* 17*dwts.* 14.4*gr.*

3. What is the Sum of .17 Ton, 19*C.* .17*qr.* and 7℔? *Anſw.* 3*C.* 2*qrs.* 15.54℔.

4. What is the Difference between .17*l.* and 7*s*? *Anſw.* 2*s.* 8*d.* 1.6*qr.*

5. What is the Difference between .41 Day, and .16 Hour? *Anſw.* 9*hrs,* 40*min.* 48 *ſec.*

Of the Single Rule *of* THREE DIRECT, *in* Decimals.

Q. HOW *do you prove the following* Queſtions?
A. By changing their Order.

EXAMPLES.

1. If 1.4℔ of Mace coſt 14.5*s.* what coſt 75.31℔? *Anſw.* 38*l.* 19*s.* 11*d.* 3.52*qrs.*

2. If 1.6*C* of Sugar coſt 3*l.* 12.76*s.* what coſt 3 Hhds. each 11*C.* 3*qrs.* 10lb? *Anſw.* 80*l.* 15*s.* 3*d.* 3.36*qrs.*

3. If 1.5*oz* of Silver be worth 7.8*s.* what is the Value of 9.7lb? *Anſw.* 30*l.* 5*s.* 3*d.* 1.44*qr.*

4. If 1.47*C.* of Sugar be worth 4.5*l.* what is 1.7lb worth at that Rate? *Anſw.* 11.1*d.*

5. If 1 Pint of Wine coſt 1.2*s.* what coſt 12.5 Hhds? *Anſ.* 378*l.*

6. If 8.4lb of Tobacco coſt 16*s.* 4.6*d.* what coſt 3 Hhds. each 4*C.* 2*qrs.* 7.4lb? *Anſw.* 149*l.* 12*s.* 3*d.* 2*qrs.*

7. If 1 Yard of Cloth coſt 12.3*s.* what coſt 3 Pieces, each 21.5 Yards? *Anſw.* 39*l.* 13*s.* 4.2*d.*

8. A Man bought a Piece of Cloth for 6*l.* 13.12*s* I demand how many Yards there were in the ſame, when he gave after the Rate of 4*s.* 2.6*d.* *per* Yard? *Anſw.* 31.569 *Yards.*

9. A Man bought 5.8 Tuns of Oil for 60.4*l.* but by Miſfortune it chanced to leak out 50.9 Gallons; I demand how he muſt ſell the reſt *per* Gallon to be no Loſer? *Anſw.* 10.27*d.* *per* Gallon.

10. Two Men bartered; *A* had 40.7 Yards of Linen, for which *B* gave him 25.6 Ells of Holland, at 4.5*s. per* Ell; I demand the Price of the Linen *per* Yard? *Anſw.* 2*s.* 9*d.* 3.8*qrs.*

11. A Grocer bought 7.6*C.* of Sugar, at 40.1*s. per C.* and ſold the ſame out at 4.5*d. per* lb; I demand whether he gained or loſt, and how much? *Anſw.* 14*s.* 5*d.* 1.12*qr. gain.*

12. A Brewer made a Quantity of Beer which coſt him 90.4*l.* and afterwards ſold it out at 26.7*s. per* Barrel, by which he gained 10*l.* I demand the Quantity that was brew'd? *Anſw.* 75 *Bar.* 7.4+*Gal.* Iriſh 75 *Bar.* 8 *Gal.* 6 *Pints*+.

13. A Grocer bought 3*C.* 1.5*qr.* of Cloves, at the Rate of 2.75*s. per* lb; and ſold them for 60*l.* 11*s.* 6*d.* what did he gain or loſe by the Bargain? *Anſw. he gained* 8*l.* 12*s.*

14. A Merchant bought 436 Yards of Cloth, for 8.5*s. per* Yard, and ſold it again for 10.75*s. per* Yard; what did he gain by the Sale thereof? *Anſw.* 49*l.* 1*s. gain.*

15. *A* owes *B* 296.85*l.* but he compounds for 7.5*s.* in the Pound; what muſt *B* receive for his Debt? *Anſw.* 111*l.* 6*s.* 4*d.* 2*qrs.*

16. Bought 3 Hhds. of Tobacco, each weighing 4*C.* 1.9*qr.* at 5.6*l. per C.* which I ſold out at 7*l.* 16*s. per C.* what did I gain by the Whole? *Anſw.* 29*l.* 10*s.* 8*d.* 1.6*qr.*

17. A Jeweller bought a Diamond for 60 Guineas, which weighed 1.5*oz.* which after it was neatly cut, he ſold again for 3.25*s. per* Grain; I demand how much he gained by the ſaid Diamond, and alſo at what Rate *per Cent.* he made his Gain?

Anſw.	*Whole Gain*	54*l.*	0*s.*	0*d.*	0*qr.*
	Rate per Cent	85	14	3	1.7+

Of

Of the SQUARE-ROOT.

Q. W*HAT is a* Square?

A. Any Number multiplied into itſelf produces a *Square.*

Q. *What is the* Extraction *of the* Square Root.

A. If a *Square* be given to find one Side, it is called the *Extraction* of the *Square-Root.*

Q. *How is the given* Square *to be prepared for* Extraction?

A. By pointing off at every two Figures, from the *Units Place,* both ways, for a *Reſolvend.*

Q. *What is a* Surd?

A. It is an imperfect *Square,* or ſuch a Number, whoſe *Square Root* can never be exactly found.

EXAMPLES.

1. What is the Square of 17.1? *Anſw.* 292.41.
2. What is the Square of 14.1? *Anſw.* 198.81.
3. What is the Square of .09? *Anſw.* .0081.
4. What is the Square of .0094? *Anſw.* .00008836.
5. What is the Square Root of 4712.81261? — — *Anſw.* 68.649+
6. What is the Square Root of 6121.80021? — — *Anſw.* 78.2419+
7. What is the Square-Root of 9712.71805? *Anſw.* 98.553+
8. What is the Square-Root of 3.1721812? — — *Anſw.* 1.78106+
9. What is the Square-Root of 1.3976121? — — *Anſw.* 1.1822+
10. What is the Square-Root of 761.801216? — — *Anſw.* 27.6007+
11. What is the Square-Root of .0007612816? — — *Anſw.* .02759+
12. What is the Square-Root of 4.000067121? *Anſw.* 2.000016+

13. There is an Army conſiſting of a certain Number of Men, who are placed Rank and File, that is, in the Form of a Square, each Side having 472 Men; I demand how many Men the whole Square contains? *Anſw.* 222784 *Men.*

14. The Floor of a certain great Room is made exactly ſquare, each Side of which contains 75 Feet; I demand how many ſquare Feet are contained therein? *Anſw.* 5625 *Feet.*

15. Suppoſe 12544 Soldiers are to be put into Rank and File, in the Form of an equal Square; I demand how many Soldiers will be in the Front, and how many deep? *Anſw.* 112 *Soldiers.*

16. A certain ſquare Pavement contains 197136 ſquare Stones all of the ſame Size; I demand how many are contained in one of its Sides? *Anſw.* 444.

17. The Wall of a Town is 17 Feet high, which is ſurrounded by a Mote of 20 Feet in Breadth; I demand the Length of a Ladder which ſhall reach from the Outſide of the Mote to the Top of the Wall? *Anſw.* 26.2+*Feet.*

Of the Square-Root *of a* Vulgar Fraction.

Q. *How is the* Square-Root *of a* Vulgar Fraction *extracted?*

A. 1. Reduce the *Fraction* to its loweſt Term.

2. Extract the *Square-Root* of the *Numerator* for a new *Numerator*, and the *Square-Root* of the *Denominator* for a new *Denominator*.

3. If the *Fraction* be a *Surd*, reduce it to a *Decimal*, and then extract the *Square-Root* from it.

4. The *Decimal Fraction* muſt conſiſt of an even Number of Places, as, *two*, *four*, &c.

EXAMPLES.

1. What is the Square-Root of $\frac{3844}{8649}$? *Anſw.* $\frac{2}{3}$.
2. What is the Square-Root of $\frac{2456}{7400}$? *Anſw.* $\frac{4}{5}$.
3. What is the Square Root of $\frac{7056}{9216}$? *Anſw.* $\frac{7}{8}$.

SURDS.

4. What is the Square-Root of $\frac{3168}{6192}$? *Anſw.* .71528+
5. What is the Square Root of $\frac{234}{306}$? *Anſw.* .87447+
6. What is the Square-Root of $\frac{387}{738}$? *Anſw.* .72414+

Of the Square-Root *of a* Mixt Number.

Q. *How is the* Square Root *of a* Mixt Number *extracted?*

A. 1. Reduce the *fractional* Part of the Mixt Number to its loweſt Term.

2. Reduce the *Mixt Number* to an *improper Fraction*.

3. Extract the *Roots* of the Numerator and Denominator, for a new *Numerator* and *Denominator*.

4 If the Mixt Number given be a *Surd*, reduce the *fractional Part* to a *Decimal*, and annex it to a whole Number, and extract the *Square-Root* from the Whole.

EXAMPLES.

Of C O N V

Extracting

A

Roots or Firſt Powers - - -	1	2
Squares or Second Powers	1	4
Cubes or Third Powers	1	8
Biquadrates, or Fourth Powers	1	1
Surſolids, or Fifth Powers	1	3
Square-Cubes, or Sixth Powers	1	6
Second Surſolids, or Seventh Powers	1	1
Biquadrates ſquared, or Eighth Powers	1	2
Cubes cubed, or Ninth Powers	1	5
Surſolids Squared, or Tenth Powers	1	1
Third Surſolids, or Eleventh Powers	1	2
Square cubes ſquared, or Twelfth Powers	1	4
Fourth Surſolids, or Thirteenth Powers	1	8
Second Surſolids Squared, or 14th Power	1	1
Surſolids cubed, or Fifteenth Powers	1	3

NVERGING SERIES;

OR,

racting the ROOTS *of all* POWERS.

A TABLE *of* POWERS.

	1	2	3	4	5	6	7	8	9
	1	4	9	16	25	36	49	64	81
	1	8	27	64	125	216	343	512	729
	1	16	81	256	625	1296	2401	4096	6561
	1	32	243	1024	3125	7776	16807	32768	59049
	1	64	729	4096	15625	46656	117649	262144	531441
ers	1	128	2817	16384	78125	279936	823543	2097152	4782969
wers	1	256	6561	65536	390625	1679616	5764801	16777216	43046721
	1	512	19683	262144	1953125	10077696	40353607	134217728	387420489
rs	1	1024	59049	1048576	9765625	60466176	282475249	1073741824	3486784401
ers	1	2048	177147	4194304	48828125	362797056	1977326743	8589934592	31381059609
wers	1	4096	531441	16777216	244140625	2176782336	13841287201	68719476736	282429536481
wers	1	8192	1594323	67108864	1220703125	13060694016	96889010407	549755813888	2541865828329
wer	1	16384	4782969	268435456	6103515625	78364164096	678223072849	4398046511104	22876792454961
rs	1	32768	14348907	1073741824	30517578125	470184984576	4747561509943	35184372088832	205891132094649

Let this fold out page 154.

EXAMPLES.

1. What is the Square Root of $37\frac{36}{49}$? *Anſw.* $6\frac{1}{7}$.
2. What is the Square-Root of $17\frac{16}{25}$? *Anſw.* $4\frac{1}{5}$.
3. What is the Square-Root of $5\frac{288}{648}$? *Anſw.* $2\frac{1}{3}$.

SURDS.

4. What is the Square-Root of $76\frac{14}{17}$? *Anſw.* 8.7649+
5. What is the Square-Root of $7\frac{9}{11}$? *Anſw.* 2.7961+

Of the CUBE-ROOT.

Q. *WHAT is a* Cube?

A. Any Number multiplied into its *Square* produces a *Cube.*

Q. *What is the Extraction of the* Cube Root?

A. If a *Cube* be given to find out a Number, which being multiplied into its *Square* produceth the Number given; this is called the Extraction of the *Cube-Root.*

Q. *How is the given* Cube *to be prepared for Extraction?*

A. By pointing off at every three Figures, both ways, from the *Units Place* for a *Reſolvend.*

Q. *What is a* Surd?

A. An *imperfect Cube,* or ſuch a Number whoſe *Cube-Root* can never be exactly found.

Q. *What Rule have you for extracting the* Cube Root *of any Number?*

A. This: The firſt Figure ſought is the *Root* of the greateſt *Cube* contained in the firſt Member, and it is called a; then $3aa+3a$ is the *Diviſor,* which finds a new Figure called e; then $3aae+3eea+eee$ is the *Subtrahend* or Number to be ſubducted; which *Operation* is to be continued to every *Reſolvend.*

Note, *This* Rule *being ſomewhat dark, I ſhall, by way of Illuſtration, ſubjoin the* Operation *at large, for extracting the* Cube-Root *of any Number.*

What is the *Cube-Root* of 444194.947?

(1) *Let the given* Number *be pointed, as before directed;*

thus 444194.947?

(2) *The firſt* Member, *which contains the greateſt* Cube, *is* 444; *and the neareſt* Root, *whoſe* Cube *is not greater than it, is* 7, *which ſet*

thus 444194.947)7

(3) *The* Cube *of* 7 *is* 343, *which ſet down and ſubtract annexing the next three Figures or Member,* viz. 194 *for* Reſolvend.

$$\begin{array}{l} \textit{thus}\ \dot{4}44\dot{1}94.64\dot{7}(7\\ \phantom{\textit{thus}\ }\underline{343}.\\ \hline \phantom{\textit{thus}\ }101194\ \textit{Reſolvend.} \end{array}$$

(4) *The Number* 7, *in the* Root, *is called* a; *then by th* Rule, 3aa+3a *is the* Diviſor; *thus,*

$$\begin{array}{r} 7=a\\ 7=a\\ \hline 49=aa\\ 3\\ \hline 147=3aa\\ 21=3a\\ \hline \textit{Diviſor}\ 1491=3aa+3a \end{array}$$

$$\begin{array}{l} \dot{4}4\dot{4}\dot{1}94.94\dot{7}(7\\ 343\\ \hline 1491(101194\ \textit{Reſolvend} \end{array}$$

5. *The next Figure in the* Root, *viz.* 6 (*found by common Diviſion*) *is called* e; *then by the* Rule, 3aae+3eea+eee, *is the* Subtrahend, *or Number to be ſubducted*; *thus,*

$$\begin{array}{r} 147=3aa\\ 6=e\\ \hline 882=3aaa\\ 756=3eea\\ 216=eee\\ \hline \textit{Sub.}\ 95976=3aae+3eea+eee \end{array}$$

$$\begin{array}{r} 6=e\quad eee\ \text{viz.}\ 6=216\\ 6=e\\ \hline 36=ee\\ 3\\ \hline 108=3=3ee\\ 7\\ \hline 756=4eea \end{array}$$

$$\begin{array}{r} \dot{4}44\dot{1}94.94\dot{7}(76\\ 343\\ \hline 1491)101194\ \textit{Reſolvend}\\ 95976\ \textit{Subtrahend}\\ \hline 5218.947\ \textit{Reſolvend.} \end{array}$$

(6) *When the next* Member *is brought down,* viz. 917, *as before, both* Figures *in the* Root, *viz.* 76, *muſt be called* a; *then to find a* Diviſor *to this laſt* Reſolvend, *ſay as before,* 3aa + 3a; *thus,*

76=*a*
76=*a*

456
532

5776=*aa*
3

17328=3*aa*
228=3*a*

Diviſor 173508=3*aa*+3*a*

76=*a*
3

228=3*a*

444194.947(76
343

1491)101194 *Reſolvend*
95976 *Subtrahend*

173508) 5218.947 *Reſolvend*

(7) *The next Figure in the* Root, *viz.* 3, *ſound as before, is alſo called* e; *then again* 3aae+3eea+eee *is the other* Subtrahend, *or Number to be ſubducted*; *thus,*

17328=3*aa*
3=*e*

51984=3*aae*
2052=3*eea*
27=*eee*

Sub. 6218947=3*aae*+3*eea*+*eee*

3=*e* viz. 3=27
3=*e*

9=*ee*
3

27=3*ee*
76=*a*

162
189

2052=3*eea*

444194.647(76.3 *Anſwer*
343

1491)101194 *Reſolvend*
95976 *Subtrahend*

173508)5218.947 *Reſolvend*
5218.947 *Subtrahend*

0

O EXAMPLES.

EXAMPLES.

1. What is the Cube of 6.4?	*Anſw.* 262.144
2. What is the Cube of .13?	*Anſw.* .002.197
3. What is the Cube of 41.1?	*Anſw.* 69426.531
4. What is the Cube of .09?	*Anſw.* 000729
5. What is the Cube of .007?	*Anſw.* .000000343
6. What is the Cube-Root of 7612812161? — —	*Anſw.* 19.67+
7. What is the Cube Root of 7612181.7612? — —	*Anſw.* 196.71+
8. What is the Cube Root of 61218 00121?	*Anſw.* 39.41+
9. What is the Cube Root of 7121.1021698? — —	*Anſw.* 19.238+
10. What is the Cube Root of 12000.812161? — —	*Anſw* 22.89+
11. What is the Cube Root of .121861281? — —	*Anſw.* 495+
12. What is the Cube Root of .0069761218? — —	*Anſw.* 19107+

13. If a cubical Piece of Timber be 41 Inches long, 4 Inches broad, and 41 Inches deep; how many cubical Inche doth it contain? *Anſw.* 68921 *cubical Inches.*

14. Suppoſe a Cellar to be dug that ſhall be 12 Feet ever way, in Length, Breadth and Depth; how many ſolid Fee of Earth muſt be taken out to compleat the ſame? *Anſw.* 172

15. Suppoſe a Stone of a cubic Form to contain 47455 ſolid Inches; what is the ſuperficial Content of one of it Sides? *Anſw.* 608 *Inches.*

Of the Cube-Root *of a* Vulgar Fraction.

Q. *How do you extract the* Cube Root *of a Vulgar Fraction*

A. 1. Reduce the *Fraction* to its loweſt Term.

2. Extract the *Cube Roots* of the Numerator and Denominator, for a new *Numerator* and *Denominator.*

3. If the *Fraction* be a *Surd,* reduce it to a *Decimal,* an then extract the *Cube Root* from it.

4. The *Decimal Fraction* muſt conſiſt of Ternaries of Place as, *three, ſix, nine,* &c.

EXAMPLES.

1. What is the Cube-Root of $\frac{352}{1188}$?	*Anſw.* $\frac{2}{3}$.
2. What is the Cube-Root of $\frac{1944}{4608}$?	*Anſw.* $\frac{3}{4}$.
3. What is the Cube Root of $\frac{648}{3000}$?	*Anſw.* $\frac{3}{5}$.

SURDS.

4. What is the Cube-Root of $\frac{4}{9}$? *Anſw.* .763+
5. What is the Cube-Root of $\frac{6}{7}$? *Anſw.* .949+
6. What is the Cube-Root of $\frac{1}{3}$? *Anſw.* .693+

Of the Cube-Root *of a Mixt Number.*

Q. *How do you extract the* Cube Root *of a* Mixt Number?

A. 1. Reduce the *fractional Part* to its loweſt Term.

2. Reduce the *Mixt Number* to an *improper Fraction.*

3. Extract the *Cube Roots* of the Numerator and Denominator, for a new *Numerator* and *Denominator.*

4. If the Mixt Number given be a *Surd,* reduce the *fractional Part* to a *Decimal,* and annex it to the whole Number, and extract the *Cube-Root* from the Whole.

EXAMPLES.

1. What is the Cube Root of $578\frac{19}{27}$? *Anſw.* $8\frac{1}{3}$.
2. What is the Cube Root of $42\frac{7}{8}$? *Anſw.* $3\frac{1}{2}$.
3. What is the Cube Root of $5\frac{104}{125}$? *Anſw.* $1\frac{4}{5}$.

SURDS.

4. What is the Cube Root of $8\frac{3}{21}$? *Anſw.* 2.013+
5. What is the Cube Root of $7\frac{3}{5}$? *Anſw.* 1.966+

Of the BIQUADRATE-ROOT.

Q. WHAT *is a* Biquadrate *Number?*

A. Any Number involved *four* times produces a *Biquadrate.*

Q. *How is the* Biquadrate-Root *extracted?*

A. Firſt extract the *Square Root* of the given *Reſolvend,* and then extract the *Square-Root* of that *Square-Root* for the *Biquadrate-Root* required.

EXAMPLES.

1. What is the Biquadrate of 48? *Anſw.* 5308416.
2. What is the Biquadrate of 96? *Anſw.* 84934656.
3. What is the Biquadrate-Root of 5308416? *Anſw.* 48.
4. What is the Biquadrate-Root of 84934656? *Anſw.* 96.
5. What is the Biquadrate-Root of 21743271936? *Anſw.* 384

Of the SURSOLID-ROOT.

Q. WHAT *is a* Surſolid?

A. Any Number involved *five* times produces a *Surſolid.*

Q. *How is the* Surſolid-Root, *or the* Root *of any other higher* Power *extracted?*

A. By the following *general Rules.*

1. If any even *Power* be given, let the *Square-Root* of it be extracted, which reduces it to half of the given Power; then the *Square-Root* of that Power reduces it to half of the ſame Power: and ſo on till you come to a *Square* or a *Cube.*

For *Example*: Suppoſe a 24th Power be given, the *Square-Root* of that reduces it to a 12th Power, the *Square-Root* of the 12th Power reduces it to a 6th Power, and the *Square-Root* of the 6th Power to a *Cube.*

2. If any odd *Power* be given as the 17th, &c. obſerve

(1) From the *Unity place,* both ways, point off at every ſuch Number of Figures as is the *Index* of the Power for a *Reſolvend.*

(2) Seek in the Table of *Powers* for ſuch a Power (being the ſame Power with the *Index*) as comes neareſt the firſt *Period,* whether greater or leſs, calling its *Root* accordingly *more than juſt,* or *leſs than juſt.*

(3) Annex ſo many *Cyphers* to the *Root* as there are *Periods* of whole Numbers remaining in the given *Reſolvend.*

(4) Find the *Difference* between the given *Reſolvend* and the *Power* coming neareſt the firſt *Period.*

(5) Whatever odd *Power* is given, the next loweſt odd *Power* to that of the ſaid *Root* muſt be found with its annexed *Cyphers: i. e.* if the 9th *Power* be given, find the 7th *Power* of the *Root* and *Cyphers*; if the 11th *Power* be given, find the 9th, &c.

(6) Multiply the next loweſt odd *Power* by the *Index* of the given *Power,* and let that Product be a *Diviſor* to the *Difference* between the given *Reſolvend* and *Power* firſt found, which depreſſes it to a *Square.*

(7) Point this *Square* into *Periods* of two Figures each.

(8) Then make the firſt *Root* without its *Cyphers* a *Diviſor,* and aſk how oft it may be found in the firſt *Period* of the *Square.*

(9) If the *Diviſor* be *leſs than juſt,* you muſt multiply the *Quotient-figure* by half the *Index, i. e.* if the *Index* be 11, multiply the *Quotient-figure* by 5; if the *Index* be 9, multiply it by 4, &c. and add it to the *Diviſor*; but if it be *more than juſt,*

you muſt ſubtract it from the *Diviſor*, having a *Cypher* annexed, or ſuppoſed to be annexed to the *Diviſor*; which *Sum* or *Difference* muſt be multiplied by the ſaid *Quotient-figure*, and ſo continued to every new Figure in the *Quotient*.

(10) If the firſt *Root* with its *Cyphers* be *more than juſt*, the *Quotient* muſt be ſubtracted from it; but if it be *leſs than juſt*, it muſt be added to it; and the *Sum* or *Difference* will be the *Root* required.

3. If an even *Power* be given, and the *Square-Root* of that *Power* being extracted, reduces it to an odd *Power*; you muſt then proceed with that odd *Power* as the foregoing *Rules* direct.

EXAMPLES.

1. What is the Surſolid-Root of 6436343?

6436343
32 *the neareſt* Surſolid, *whoſe* Root *and* Cypher is 20.

3236343
The Cube *of* 20 *is*=8000
And 8000 × 5 *is*=40000
Then 40000)3236343(80
Again 2)80(3
+ 3 × 2 = 6 78
1ſt *Diviſor* = 26 —
2 *to be rejected*
Laſtly 20
+3
23 *the Surſolid Root required.*

Note, *This is a very expeditious Way of extracting the* Roots of high Powers; *but it is not always exact, becauſe* (*as Mr.* Ward *obſerves, for it was taken from him*) *there will be a* Remainder, *and ſometimes an* Exceſs *or* Defect *in the laſt Figure of the* Root *when the given* Reſolvend *or* Power *hath a true* Root, *as appears by the* fifth Example *following, whoſe true* Root *ſhould not be* 384.3 *as it there ſtands, but* 384.

2. What is the Surſolid of 48? *Anſw.* 254803968.
3. What is the Surſolid Root of 8153726976? *Anſw.* 96.
4. What is the Surſolid Root of 254803968? *Anſw.* 48.
5. What is the Surſolid Root of 8349416423424? *Anſw.* 384.3.

Of the SQUARE-CUBE-ROOT, *or* Root *of the* Sixth Power.

Q. WHAT *is a* Square Cube?

A. Any Number involved *ſix times*, produces a *Square-Cube.*

EXAMPLES.

1. What is the Square Cube of 48? *Anſw.* 12230590464.

2. What is the Square Cube Root of 782757789696.? — — — — — *Anſw.* 96.

3. What is the Square Cube Root of 12230590464.? — — — — — *Anſw.* 48.

4. What is the Square Cube-Root of 3206175906594816.? — — — *Anſw.* 384.

Of the Second SURSOLID-ROOT, *or* Root *of the* Seventh Power.

Q. WHAT *is a* ſecond Surſolid?

A. Any Number involved *ſeven times*, produces a *ſecond Surſolid.*

EXAMPLES.

1. What is the ſecond Surſolid of 96.? ——— *Anſw.* 75144747810816

2. What is the ſecond Surſolid-Root of 75144747810816.? ——— *Anſw.* 96.

3. What is the ſecond Surſolid-Root of 587068342272? ——— ——— *Anſw.* 48.

4. What is the ſecond Surſolid Root of 1231171548132409344? — *Anſw.* 384.42.

Of the SQUARE-BIQUADRATE-ROOT, *or* Root *of the* Eighth Power.

Q. WHAT *is a* Square Biquadrate?

A. Any Number involved *eight times*, is a *Biquadrate ſquared.*

EXAMPLES.

EXAMPLES.

1. What is the ſquared Biquadrate of 48? —— *Anſw.* 2817928042905 6.

2. What is the Square-Biquadrate-Root of 721.389578983833 6.? —— } *Anſw.* 96.

3. What is the Square-Biquadrate-Root of 281792804290 56.? —— } *Anſw.* 48.

4. What is the Square Biquadrate-Root of 472769874482845188096.? —— } *Anſw.* 384.

Of the CUBED-CUBE-ROOT, *or* Root *of the* Ninth Power.

Q. WHAT *is a* cubed Cube?

A. Any Number involved *nine times*, is a *cubed Cube.*

EXAMPLES.

1. What is the cubed Cube-Root of 692533995824480256.? —— } *Anſw.* 96 2

2. What is the cubed Cube-Root of 1352605460594688.? —— } *Anſw.* 48.09.

3. What is the cubed Cube-Root of 181543631801412552228864.? ---- } *Anſw.* 384.5.

Of the SQUARE-SURSOLID-ROOT, *or* Root *of the* Tenth Power.

Q. WHAT *is a* ſquared Surſolid?

A. Any Number involved *ten times*, produces a *ſquared Surſolid.*

EXAMPLES.

1. What is the ſquared Surſolid-Root of 64925061108545024.? —— —— } *Anſw.* 48.

2. What is the ſquared Surſolid-Root of 66483263599150104576.? —— —— } *Anſw.* 96.

3. What is the ſquared Surſolid-Root of 69712754611742420055883776.? —— } *Anſw.* 384.3

Of the Third SURSOLID-ROOT, *or* Root *of the* Eleventh Power.

Q. W*HAT is a* third Surſolid?

A. Any Number involved *eleven times,* produces a *third Surſolid.*

EXAMPLES.

1. What is the third Surſolid Root of 95280975791392 7? — — — — — } *Anſw.* 23.

2 What is the third Surſolid Root of 3116432981210161152.? — — } *Anſw.* 48.

3. What is the third Surſolid-Root of 6382393305518410039296.? — — } *Anſw.* 96.

Of the SQUARED SQUARE-CUBE-ROOT, *or* Root *of the* Twelfth Power.

Q. W*HAT is a* ſquared Square Cube?

A. Any Number involved *twelve times,* produces a *ſquared Square-Cube.*

EXAMPLES.

1. What is the Root of this ſquared Square-Cube 149587343098087735296.? — — } *Anſw.* 48.

2. What is the Root of this ſquared Square Cube 6127097573297673637772416 ? — } *Anſ.* 96.

3. What is the Root of this ſquared Square Cube 1027956394402909029176039807385 6 } *Anſw.* 384

Of SIMPLE INTEREST.

Q. W*HAT particular* Letters *are uſed here?*

A. Theſe; *P.* any *Principal.*
T. the *Time.*
R. the *Ratio* of the Rate *per Cent.*
A. the *Amount.*

Q. *What is the* Ratio?

A. It ſignifies only the *Simple Intereſt* of 1*l.* for one Year, at any propoſed Rate of Intereſt *per Cent.* and is thus found:

100 : 6 : : 1 : 0. 06
100 : 5 : : 1 : 0. 05

A TABLE

A TABLE *of* *RATIOS.*

Rate per Ct.	*Ratio*	*Rate per C.*	*Ratio*
2	.02	6½	.065
3	.03	7	.07
3½	.035	7½	.075
4	.04	8	.08
4½	.045	8½	.085
5	.05	9	.09
5½	.055	9½	.095
6	.06	10	.1

CASE 1.

Q. *When* P T *and* R *are given to find* A; *how is it diſcovered?*

A. Thus, $ptr \times p = a$.

Note, *Any Quantity of* Letters *put together like a Word, denote continual Multiplication.*

EXAMPLES.

1. What Sum will 567*l.* 10*s.* amount to in 9 Years, at 6 *per cent. per ann?* *Anſw.* 873*l.* 19*s.*

2. What will 508*l.* 14*s.* amount to in 1 Year, at 5 *per cent. per ann?* *Anſw.* 534*l.* 2*s.* 8*d.* 1.6*qr.*

3. What will 600*l.* 14*s.* amount to in 10 Years, at 4½ *per cent. per ann?* *Anſw.* 871*l.* 0*s.* 3*d.* 2.4*qrs.*

4. What will 4000*l.* amount to in 5 Years, at 3½ *per cent. per ann?* *Anſw.* 4700*l.*

Note, *When the* Time *given, does not conſiſt of whole* Years, *then reduce the odd* Time *into Decimal Parts of a* Year; *and unleſs ſuch Parts of a* Year *chance to be juſt* ¼, ½, *or* ¾ *of a* Year, *the beſt way will be to reduce the odd* Time *into* Days, *and then work with the Decimal Parts of a* Year, *that are equivalent to thoſe Days.*

A TABLE *for the ready finding the Decimal Parts of a* Year; *equal to any Number of* Days, *or* Quarters *of a* Year.

Days.	*Decimal Pts.*	*Days.*	*Decimal Pts.*	*Days.*	*Decimal Pts.*
1	.00274	10	.027397	100	.273973
2	.005479	20	.054794	200	.547945
3	.008219	30	.082192	300	.821918
4	.010959	40	.109589	365	1.000 000
5	.013659	50	.136986		
6	.016438	60	.164383	¼ *of a Year*	.25
7	.019178	70	.191781	½ *of a Year*	.5
8	.021918	80	.219178	¾ *of a Year*	.75
9	.024657	90	.246575		

Note, *When the true Number of* Days *cannot be found at one View in this* Table, *then both them and their* Decimals *muſt be taken out of the* Table *at* twice *or* thrice, *as their Number requires, and added togeher. So the Decimal Parts of a Year*=236 Days, *are thus found*,

200=547954
30=082192
6=016438

336=646575

EXAMPLES.

5. What will 7200*l*. amount to in 6½ Years, at 5 *per cent. per ann?* *Anſw.* 9540*l*.

6. What will 1110*l*. 18*s*. amount to in 12¾ Years, at 5 *per cent. per ann?* *Anſw.* 1819*l*. 1*s*. 11*d*. 2 8*qrs*.

7. What will 280*l*. 10*s*. amount to in 3 Years and 148 Days, at 5 *per cent. per ann?* *Anſw.* 382*l*. 5*s*. 2*d*. 3.38+*qrs*.

8. What will 196*l*. amount to in 189 Days, at 4 *per cent. per ann?* *Anſw.* 200*l*. 1*s*. 7.1*d*.

CASE 2.

Q. *When* A, T *and* R *are given to find* P; *how is it diſcovered?*

A. Thus $\frac{a}{tr+1}=p$.

EXAMPLES.

EXAMPLES.

1. I demand what Principal will amount to 873*l.* 19*s.* in 9 Years, at 6 *per cent per ann?* *Anſw.* 567*l.* 10*s.*

2. I demand what Principal will amount to 534*l.* 2*s.* 0*d.* 1.6*qr.* in 1 Year at 5 *per cent. per ann?* *Anſw.* 504*l.* 14*s.*

3. I demand what Principal will amount to 9540*l.* in 6½ Years at 5 *per cent. per ann?* . *Anſw.* 7200*l.*

4. I demand what Principal will amount to 1819*l.* 1*s.* 11*d.* 2.8*qrs.* in 12¾ Years at 5 *per cent. per ann?* *Anſw.* 1110*l.* 18*s,*

5. I demand what Principal will amount to 871*l.* 0*s.* 3*d.* 2.4*qrs.* in 10 Years at 4½ *per cent per ann?* *Anſw.* 600*l.* 14*s.*

6. I demand what Principal will amount to 4700*l.* in 3 Years at 3½ *per cent. per ann?* *Anſw.* 4000*l.*

7. I demand what Principal will amount to 328*l.* 5*s.* 2*d.* 3.38*qrs.* in 3 Years and 148 Days, 2 *per cent?* *Anſw.* 280*l.* 10*s.*

8. What Principal being put to Intereſt for 189 Days, at 4 *per cent.* will amount to 200*l.* 1*s.* 7.1*d?* *Anſw.* 196.

CASE 3.

Q. *When* A, P *and* T *are given to find* R; *how is it diſcovered?*

A. Thus $\frac{a-p}{tp}=e$

EXAMPLES.

1. At what Rate *per cent* will 567*l.* 10*s.* amount to 873*l.* 19*s.* in 9 Years? *Anſw.* 6*l. per cent.*

2. At what Rate *per cent.* will 501*l.* 14*s.* amount to 534*l.* 2*s.* 8*d.* 1.6*qr* in 1 Year? *Anſw.* 5*l. per cent.*

3. At what Rate *per cent* will 7200*l.* amount to 9540*l.* in 6½ Years? *Anſw.* 5*l. per cent.*

4. At what Rate *per cent.* will 1110*l.* 18*s.* amount to 1819*l.* 1*s.* 11*d.* 2.8*qrs.* in 12¾ Years? *Anſw.* 5*l. per cent.*

5. At what Rate *per cent.* will 600*l.* 14*s.* amount to 871*l.* 0*s.* 3*d.* 2.4*qrs* in 10 Years? *Anſw.* 4½ *per cent.*

6. At what Rate *per cent* will 4000*l.* amount to 4700*l.* in 5 Years? *Anſw.* 3½ *per cent.*

7. At what Rate *per cent.* will 280*l.* 10*s.* amount to 328*l.* 5*s.* 2*d.* 3.38*qrs.* in 3 Years and 148 Days? *Anſw.* 5*l. per cent.*

8. At what Rate *per cent.* will 196*l.* amount to 200*l.* 1*s.* 7.1*d.* in 189 Days? *Anſw.* 4*l. per cent.*

CASE 4.

Q. *When* A, P *and* R *are given to find* T, *how is it diſcovered?*

A. Thus $\frac{a-p}{rp}=t$.

EXAMPLES.

1. In what time will 567*l.* 10*s.* amount to 873*l.* 19*s.* at 6 *per cent?* *Anſw.* 9 *Years.*

2. In what time will 508*l.* 14*s.* amount to 534*l.* 2*s.* 8*d.* 1.6*qrs.* at 5 *per cent?* *Anſw.* 1 *Year.*

3. In what time will 7200*l.* amount to 9540*l.* at 5 *per cent?* *Anſw.* 6½ *Years.*

4. In what time will 1110*l.* 18*s.* amount to 1819*l.* 1*s.* 11*d.* 2.8*qrs.* at 5 *per cent?* *Anſw.* 12¾ *Years*

5. In what time will 600*l.* 14*s.* amount to 871*l.* 0*s.* 3*d.* 2.4*qrs.* at 4½ *per cent?* *Anſw.* 10 *Years.*

6. In what time will 4000*l.* amount to 4700*l.* at 3½ *per cent?* *Anſw.* 5 *Years.*

7. In what time will 280*l.* 10*s.* amount to 328*l.* 5*s.* 2*d.* 3.38*qrs.* at 5 *per cent?* *Anſw.* 3 *Years and* 148 *Days.*

8. In what time will 196*l.* amount to 200*l.* 1*s.* 7.1*d* at 4 *per cent?* *Anſw.* 189 *Days.*

Of Annuities *or* Penſions *in* Arrears.

Q. *What is meant by* Annuities *or* Penſions *in* Arrears?

A. *Annuities* or *Penſions* are ſaid to be in *Arrears,* when they are payable, either Yearly, Half-yearly or Quarterly, and are unpaid for any Number of Payments.

Note, U *repreſents the* Annuity, Penſion, *&c.* R, T *and* A, *as before.*

CASE 1.

Q. *When* U, R *and* T *are given to find* A, *how is it diſcovered?*

A. Thus $\frac{tut-tu}{2}\times r:+tu=a$

EXAMPLES.

1. If an Annuity of 70*l.* be forborn 5 Years, what will it amount to in that time at 5 *per cent?* *Anſw.* 385*l.*

2. If the Payment of a Penſion be omitted for 7 Years, what will be the Amount in that time at 6 *per cent* when the Penſion is 56*l.* *per ann?* *Anſw.* 462*l.* 11*s.* 2*d.* 1.6*qr.*

3. A Houſe is lett upon Leaſe for 7 Years at 50*l. per ann.* I demand the Amount for that time at 4 *per cent.* for the Forbearance of Payment? *Anſw* 392*l.*

4. Suppoſe a Sallary of 100*l. per annn.* be forborn 7 Years, what is the Amount at 4½ *per cent?* *Anſw.* 794*l.* 10*s.*

Note, *When the* Annuities *or* Rents *are to be paid by* half-yearly *or* quarterly *Payments, as moſt generally they are, then,*

For half-yearly *Payments take* (*always*) *half of the* Ratio, *half of the* yearly *Rent, and twice the Number of* Years; *that is, reduce the* Years *into* Half-years, *for* R, U *and* T; *But,*

For quarterly *Payments, take a fourth Part of the* Ratio, *a fourth Part of the* yearly *Rent, and four times the Number of* Years; *that is, reduce the* Years *into* Quarters, *and work as before.*

EXAMPLES.

5. If 70*l.* Annuity, payable every Half-year, were unpaid 5 Years, what will it amount to in that time at 5 *per cent?* *Anſw.* 389*l.* 7*s.* 6*d.*

6. If 70*l.* Annuity, payable every Quarter, were unpaid 5 Years, what will it amount to in that time at 5 *per cent?* *Anſw.* 391*l.* 11*s.* 3*d.*

Note, *By comparing theſe two* Examples *with the firſt, it may be obſerved, that the Amount of* half-yearly *Payments is more advantageous than* yearly *Payments, and* quarterly *than* half-yearly *Payments.*

CASE 2.

Q. *When* A, R *and* T *are given to find* U, *how is it diſcovered?*

A. Thus $\frac{2a}{trt-tr+2t}=u$

EXAMPLES.

1. If the Amount of an Annuity for 5 Years at 5 *per cent.* be 385*l.* what is the Annuity? *Anſw* 70*l.*

2. If the Amount of a Penſion be 462*l.* 11*s.* 2*d.* 1.6*qr.* the Time be 7 Years, and the Rate *per cent.* 6*l.* what is the Penſion? *Anſw.* 56*l.*

3. If a Houſe be lett upon Leaſe for 7 Years, and the Amount for that time be 392*l.* at 4 *per cent.* what is the yearly Rent? *Anſw.* 50*l.*

4. If a Salary amounts to 794*l.* 10*s.* in 7 Years, at 4½ *per cent.* what is the Salary? *Anſw.* 100*l. per ann.*

Note, *When the Payments are* half-yearly, 4a *muſt be divided; but when they are* quarterly, *then* 8a *muſt be divided, as before.*

EXAMPLES.

5. If the Amount of an Annuity, payable half-yearly, for 5 Years at 5 *per cent.* be 389*l.* 7*s.* 6*d.* what is the Annuity? *Anſw.* 70*l.*

6. If the Amount of an Annuity, payable quarterly for 5 Years at 5 *per cent.* be 391*l.* 11*s.* 3*d.* what is the Annuity? *Anſw.* 70*l.*

CASE 3.

Q. *When* U, A *and* T *are given to find* R, *how is it diſcovered?*

A. Thus $\frac{2a-2ut}{utt-ut}=r$.

EXAMPLES.

1. If an Annuity of 70*l. per ann.* amounts to 315*l.* in 5 Years; I demand the Rate *per cent?* *Anſw.* 5*l.*

2. If a Penſion of 56*l. per ann.* amounts to 462*l.* 11*s.* 2*d.* 1.6*qr.* in 7 Years; what is the Rate *per cent?* *Anſw.* 6*l. per cent.*

3. If a Houſe be let upon Leaſe for 7 Years at 50*l. per ann.* and the Amount for that Time being 392*l.* what is the Rate *per cent?* *Anſw.* 4*l. per cent.*

4. If a Salary of 100*l. per ann.* being forborn 7 Years, amounts to 794*l.* 10*s.* I demand the Rate *per cent?* *Anſw.* 4½ *per cent.*

Note, *When the Payments are* half-yearly, *then* 4a—4ut *muſt be divided; but when they are* quarterly, *then* 8a—8ut *muſt be divided, as before.*

EXAMPLES.

5. If an Annuity of 70*l. per ann.* payable half-yearly, being forborn 5 Years, amounts to 389*l.* 7*s.* 6*d.* I demand the Rate *per cent?* *Anſw.* 5*l. per cent.*

6. If an Annuity of 70*l. per ann.* payable quarterly, amounts to 391*l.* 11*s.* 3*d.* in 5 Years; I demand the Rate *per cent?* *Anſw.* 5 *per cent.*

CASE

CASE 4.

Q. *When* U, A *and* R *are given to find* T, *how is it diſcovered?*

A. Thus; Firſt $\frac{2}{r}-1=x$.

Secondly $\sqrt{\frac{a}{ru}+\frac{xx}{4}}-\frac{1}{2}x=t$.

EXAMPLES.

1. In what Time will 70*l. per ann.* amount to 385*l.* forborn at 5 *per cent?* *Anſw.* 5 *Years.*

2. In what Time will a Penſion of 56*l. per ann.* amount to 462*l.* 11*s.* 2*d.* 1.6*qr.* at 6 *per cent?* *Anſw.* 7 *Years.*

3. If a Houſe be lett upon Leaſe for a certain Time, for 50*l. per ann.* and the Amount be 392*l.* at 4 *per cent.* I demand the Time that it was lett for? *Anſw.* 7 *Years.*

4. If a Salary of 100*l. per ann.* being forborn a certain time, amount to 794*l.* 10*s.* at $4\frac{1}{2}$ *per cent.* I demand the Time of Forbearance? *Anſw.* 7 *Years.*

Note, *If the Payments were* half-yearly, *then* T *will be equal to the Number of* Half-years, *or Payments*; *but if they were to be made* quarterly, *then* T *will be equal to the Number of* quarterly *Payments.*

EXAMPLES.

5. If an Annuity of 70*l. per ann.* payable half-yearly, being forborn, amount to 389*l.* 7*s.* 6*d.* at 5 *per cent.* I demand the Time and Payments forborn? *Anſw.* 10 *Payments* =5 *Years.*

6. If an Annuity of 70*l. per ann.* payable quarterly, being forborn, amount to 391*l.* 11*s.* 3*d.* at 5 *per cent.* I demand the Time and Payments forborn? *Anſw.* 20 *Payments* =5 *Years.*

Of the Preſent Worth *of* Annuities *or* Penſions, *&c.*

Note, P *repreſents the* preſent Worth; U, T *and* R *as in the laſt.*

CASE 1.

Q. *When* U, T *and* R *are given to find* P, *how is it diſcovered?*

A. Thus $\frac{rtt-rt+2t}{2rt+2}:\times u=p$.

EXAMPLES.

1. What is the preſent Worth of 50*l.* *per ann.* to continue 6 Years at 5 *per cent?* *Anſw.* 259*l.* 12*s.* 3*d.* 2.4+*qrs.*

2. What is 80*l.* yearly Rent, to continue 5 Years, worth in ready Money at 6 *per cent?* *Anſw.* 344*l.* 12*s.* 3*d.* 2.5+ *qrs.*

3. What is a Salary of 40*l.* *per ann.* to continue 7 Years, worth in ready Money at 4 *per cent?* *Anſw.* 245*l.*

4. What is a Penſion of 30*l.* *per ann.* for 5 Years, worth in ready Money at 4½ *per cent?* *Anſw.* 133*l.* 9*s.* 4*d.* 2.6+ *qrs.*

Note, *Obſerve the ſame* Note *here which is given in* Caſe 1 *in* Annuities *and* Penſions *in* Arrears, *concerning* half-yearly *and* quarterly *Payments.*

5. What is the preſent Worth of 50*l.* *per ann.* payable half-yearly for 6 Years at 5 *per cent?* *Anſw.* 262*l.* 10*s.*

6. What is the preſent Worth of 50*l.* *per ann.* payable quarterly for 6 Years at 5 *per cent?* *Anſw.* 263*l.* 18*s.* 9*d.* 3.6*qrs.*

Note, *By comparing theſe two* Examples *with the firſt, it may be obſerved, that the* preſent Worth *of* half-yearly *Payments, is more advantageous than* yearly *Payments, and the* preſent Worth *of* quarterly *than* half-yearly *Payments.*

CASE 2

Q. *When* P, T *and* R *are given to find* U, *how is it diſcovered?*

A. Thus $\frac{rt+1}{rtt-rt+2t}:\times 2p=u$

EXAMPLES.

1. There is a Leaſe of a Houſe 6 Years to come; I demand the yearly Rent, when the preſent Worth at 5*l.* *per cent.* is 259*l.* 12*s.* 3*d.* 2*qrs?* *Anſw.* 50*l.* *per ann.*

2. What yearly Rent is that, the preſent Worth of which for 5 Years is 314*l.* 12*s.* 3*d.* 2*qrs.* at 6 *per cent?* *Anſw.* 80*l. per ann.*

3. What Salary is that, which for 7 Years Continuance at 4 *per cent.* produces 245*l.* for the preſent Worth? *Anſw.* 40*l. per ann.*

4. If the preſent Worth of a Penſion, to continue 5 Years at 4½ *per cent.* be 133*l.* 9*s.* 4*d.* 2*qrs.* I demand the Penſion? *Anſw.* 30*l. per ann.*

Note, *When the Payments to be made are* half-yearly; *you muſt multiply by* 4p; *but when they are* quarterly, *then multiply by* 8p *to find* u.

EXAMPLES.

5. There is a Leaſe of an Houſe, payable half-yearly, for 6 Years to come; I demand the yearly Rent, when the preſent Worth at 5 *per cent.* is 262*l.* 10*s.*? *Anſw.* 50*l.*

6. There is a Leaſe of an Houſe, payable quarterly, for 6 Years to come; I demand the yearly Rent, when the preſent Worth at 5 *per cent.* is 263*l.* 18*s.* 9*d.* 3.6*qrs*? *Anſw.* 50*l.*

CASE 3.

Q. *When* U, P *and* T *are given to find* R, *how is it diſcovered?*

A. Thus, $\frac{2ut-2p}{2pt-utt-ut}=r.$

EXAMPLES.

1. I demand at what Rate *per cent.* will the yearly Rent of 50*l.* to continue 6 Years, produce the preſent Worth of 259*l.* 12*s.* 3*d.* 2*qrs*? *Anſw.* 5*l. per cent.*

2. If the yearly Rent of 80*l. per ann.* to continue 5 Years, bring 344*l.* 12*s.* 3*d.* 2*qrs.* preſent Worth; what is the Rate *per cent?* *Anſw.* 6*l. per cent.*

3 If a Salary of 40*l. per ann.* to continue 7 Years, produce 245*l.* for the preſent Worth; what is the Rate *per cent?* *Anſw.* 4*l. per cent.*

4. If a Penſion of 30*l. per ann.* to continue 5 Years, produce 139*l.* 9*s.* 4*d.* 2*qrs.* for the preſent Worth; what is the Rate *per cent?* *Anſw.* 4½*l. per cent.*

Note, *When the* Annuities *or* Rents *are to be paid* half-yearly *or* quarterly, *then*

For half-yearly *Payments, take* half *of the* Annuity *or* yearly Rent, *and* twice *the Number of Years; that is, reduce the* Years *into* Half-years, *and then the* Quotient *of the upper Part divided by the lower, will be the* Ratio *of* half the Rate per Cent.

For quarterly *Payments, take a* fourth Part *of the* Annuity *or* yearly Rent, *and* four *times the Number of Years; that is, reduce the* Years *into* Quarters, *and then the* Quotient *of the upper Part divided by the lower, will be the* Ratio *of a* fourth Part *of the* Rate per Cent.

EXAMPLES.

5. A Leaſe of an Houſe of 50*l.* *per ann.* payable half-yearly having 6 Years to come, is ſold for 262*l.* 10*s.* I demand the Rate *per cent?* *Anſw.* 5*l.* *per cent.*

6. A Leaſe of an Houſe of 50*l.* *per ann.* payable quarterly, having 6 Years to come, is ſold for 263*l.* 18*s.* 9*d.* 3*qrs.* I demand the Rate *per cent?* *Anſw.* 5*l.* *per cent.*

CASE 4.

Q. *When* U, P *and* R *are given to find* T, *how is it diſcovered?*

A. Thus; *Firſt,* $\frac{2}{r}\quad\frac{2p}{u}-1=x$:

Secondly, $\sqrt{\frac{2p}{ru}+\frac{xx}{4}}:-\ \frac{x}{2}=t.$

EXAMPLES.

1. If 50*l.* yearly Rent produce the preſent Worth of 259*l.* 12*s.* 3*d.* 2*qrs.* at 5 *per cent.* what is the Time of its Continuance? *Anſw.* 6 *Years.*

2. I demand how long 80*l.* *per ann.* may be purchaſed for 344*l.* 12*s.* 3*d.* 2*qrs.* at 6 *per cent?* *Anſw.* 5 *Years.*

3. How long muſt a Salary of 40*l.* *per ann.* be enjoyed for 245*l.* at 4 *per cent?* *Anſw.* 7 *Years.*

4. What Time may a Penſion of 30*l.* *per ann.* be bought for 133*l.* 9*s.* 4*d* 2*qrs.* at 4½ *per cent.?* *Anſw.* 5 *Years.*

Note 1, *If the Payments are to be* half-yearly, *then* U *will be* = *half of the given* Leaſe, Penſion, *&c. and* R *will be* = *half of the* Ratio *of the given* Rate; *and* T *which is required will be* = *the Number of* Payments *or* Half-years.

2. *If the Payments are to be* quarterly, *then* U *will be* = *a* fourth Part *of the given* Leaſe, Penſion, *&c. and* R *will be* = *a* fourth Part *of the* Ratio *of the given* Rate, *and* T *will be* = *the Number of* quarterly *Payments.*

EXAMPLES.

EXAMPLES.

5. A Leaſe of an Houſe of 50*l. per ann.* payable half-yearly, is ſold for 262*l.* 10*s.* at 5 *per cent.* I demand the Number of Payments, and the Time to come? *Anſw.* 12 *Payments* =6 *Years.*

6. A Leaſe of an Houſe of 50*l. per ann.* payable quarterly, is ſold for 263*l.* 18*s.* 9*d.* 3*qrs.* at 5 *per cent.* I demand the Number of Payments, and the Time to come? *Anſw.* 24 *Payments*=6 *Years.*

Of Annuities, Leaſes, *&c. taken in* Reverſion.

CASE 1.

Q. *How do you find the* preſent Worth *of an* Annuity *&c. in* Reverſion?

A. Thus; *Firſt*, Find the *preſent Worth* of the yearly Sum at the given *Rate*, and for the Time of its Continuance; to do which, there are given *U, T* and *R* to find *P*, which is thus diſcovered:

$$\frac{rtt-rt+2t}{2rt+2}:\times u=p.$$

Secondly, Find what *Principal* being put to *Intereſt*, will amount to *P*, at the ſame *Rate*, and for the *Time* to come before the *Annuity*, &c. commences; and that will be the *preſent Worth* of the *Annuity*, &c. in *Reverſion*: Therefore let *P* be changed into *A*= the *Amount*, and then there will be given *A R* and *T* to find *P*, or the *Principal*, which is thus diſcovered;

$$\frac{a}{tr+1}=p.$$

EXAMPLES.

1. What is the preſent Worth of a Leaſe of 30*l. per ann.* to continue 3 Years, but is not to commence till the End of 2 Years, allowing 4 *per cent.* to the Purchaſer? *Anſw.* 77*l.* 7*s.* 7.2*d.*

2. I have the Promiſe of a Penſion of 17*l. per ann.* for 7 Years, but it does not commence till the End of 4 Years; and I am willing to diſpoſe of the ſame for preſent Payment, at the Rate of 5 *per cent.* I demand the preſent Worth? *Anſw.* 84*l.* 9*s.* 6*d.*

3. There is a Legacy of 20*l. per ann.* for 8 Years, left to a Perſon of 16 Years of Age; the Time of Payment is to commence at the Year of Perfection, *i. e.* at 21 Years; but he wanting a Sum of Money, is minded to ſell the ſame at 4 *per cent.* I demand the preſent Worth? *Anſw.* 115*l.* 3*s.* 0*d.* 1.44*qr.*

4. A good natured Gentleman being minded to beſtow a Favour upon an unthankful Wretch, ſettled upon him an Income of 35*l.* *per ann.* for 12 Years, to commence 5 Years after ſuch Settlement; but he wanting Money to follow his Extravagancies, ſold it at the Rate of 10 *per cent.* I demand how much he received for the preſent Worth? *Anſw.* 19*l.* 5*s.* 5*d.* 1.792*qr.*

CASE 2.

Q. *How do you find the yearly Income of an* Annuity, &c. *in* Reverſion.

A. Thus; *Firſt*, find the *Amount* of the *preſent Worth* of the yearly Sum, at the given *Rate* and for the *Time* before the *Reverſion*, to do which, there are given *P*, *T* and *R*, to find *A*, which is thus diſcovered;

$$ptr+p=a.$$

Secondly, Find what yearly Rent being ſold will produce *A* for the *preſent Worth*, at the ſame *Rate*, and for the *Time* of its Continuance, and that will be the yearly Sum required: Therefore change *A* into *P*, and then there will be given *P*, *R* and *T* to find *U*, or the yearly Sum, thus;

$$\frac{rt+1}{rtt-rt+21} : \times 2p=u.$$

EXAMPLES.

1. There is a Leaſe of an Houſe taken for 3 Years, but commences not till the End of 2 Years, and the Leſſee would ſell the ſame for 77*l.* 7*s.* 7.2*d.* preſent Payment; I demand the yearly Rent? *Anſw.* 30*l.* *per ann.*

2. I have the Promiſe of a Penſion for 7 Years, which will not commence till the End of 4 Years, and I have diſpoſed of the ſame for the preſent Payment of 84*l.* 9*s.* 6*d.* allowing 5 *per cent.* to the Purchaſer; I demand the yearly Income? *Anſw.* 17*l.* *per ann.*

3. There is a Legacy of a certain Rate *per ann.* for 8 Years, left to a Perſon of 16 Years of Age; but the time of Payment muſt not commence till the Age of Perfection; and the ſame Perſon wanting a Sum of Money, ſold it for 145*l.* 3*s.* 0*d.* 2*qrs.* allowing 4 *per cent.* to the Buyer; I demand the yearly Rate? *Anſw.* 20*l.* *per ann.*

4. A good natured Gentleman, being minded to beſtow a Favour upon an unthankful Wretch, ſettled an income upon

him for 12 Years, at a certain Rate *per ann.* to commence 5 Years after ſuch Settlement, but he wanting Mony to follow his Extravagancies, ſold it for 197*l.* 5*s.* 5*d.* 2*qrs.* allowing 10 *per cent.* to the Buyer for preſent Payment; I demand the yearly Value? *Anſw.* 35*l. per ann.*

Of SIMPLE INTEREST *for* Days.

Q. *How do you find the* Simple Intereſt *of any Sum of* Money *for any Number of* Days?

A. Multiply the *Intereſt* of one Pound for one Day, at the given *Rate*, by the *Principal*, and by the Number of *Days*; the laſt *Product* is the *Intereſt* required.

Note, *The Intereſt of one Pound for one Day, at* per cent.

1 *is* = .00002739726
2 *is* = .00005479452
3 *is* = .00008219178
4 *is* = .00010958904
5 *is* = .00013698634
6 *is* = .00016438356
7 *is* = .00019178082
8 *is* = .00021917808
9 *is* = .00024657534
10 *is* = .00027397260

EXAMPLES.

1. What is the Intereſt of 120*l.* for 126 Days, at 4 *per cent?* *Anſw.* 1*l.* 13*s.* 1*d.* 2*qrs.*+

2. What is the Intereſt of 126*l.* for 145 Days, at 6 *per cent?* *Anſw.* 3*l.* 0*s.* 0*d.* 3*qrs.*+

3. What is the Intereſt of 100*l.* from the 1ſt of *June* 1763, to the 9th of *March* following at 5 *per cent?* *Anſw.* 3*l.* 16*s.* 11*d.* 3 *qrs.*

4. What is the Intereſt of 200*l.* from the 14th of *Auguſt* 1763, to the 19th of *December* following at 6 *per cent?* *Anſ.* 4*l.* 4*s.* 1*d.* 3*qrs.*

5. What is the Intereſt of 10*l.* for 25 Days, at 5 *per cent?* *Anſw.* 8*d.*+

6. What is the Intereſt of 40*l.* for 40 Days, at 4 *per cent?* *Anſw.* 3*s.* 6*d.*+

Note, *There is another way of anſwering* Queſtions *in* Intereſt *for* Days, *which is laid down in* Caſe 1. *in* Simple Intereſt, *Page* 138, *as appears by the eighth Queſtion in that* Caſe. *The Reader may uſe which he likes beſt.*

Of REBATE *or* DISCOUNT.

Q. *What particular* Letters *are uſed in* Rebate?

A. Theſe;

S. the *Sum* to be *diſcounted*;

P. the *preſent Worth* of that Sum, due at any *Time* to come;

T. the *Time* before it becomes due:

R, the *Ratio* of the Rate *per cent.*

CASE 1.

Q. *When* S, T *and* R *are given to find* P, *how is it diſcovered?*

A. Thus; $\frac{s}{tr+1}=p$.

EXAMPLES.

1. What is the preſent Worth of 795*l.* 11*s.* 2*d.* for 11 Months at 6 *per cent?* *Anſw.* 754*l.* 1*s.* 8*d.*

2. What is the preſent Worth of 161*l.* 10*s.* for 19 Months, at 5 *per cent?* *Anſw.* 149*l,* 13*s.* 0*d.* 3*qrs.*+

3. If a Legacy of 1000*l.* is left me the 24th of *July* 1743, to be paid on the *Chriſtmas-day* following; what muſt I receive when I allow 6 *per cent.* for preſent Payment? *Anſw.* 975*l.* 3*s.* 0*d.* 3*qrs.*+

CASE 2.

Q. *When* P, T *and* R *are given to find* S, *how is it diſcovered?*

A. Thus; $ptr+p=s$.

EXAMPLES.

1. Suppoſe I receive 754*l.* 1*s.* 8*d.* now for a Sum of Money due 11 Months hence, allowing 6 *per cent.* for preſent Payment; I demand the Sum that was due at firſt? *Anſw.* 795*l.* 11*s.* 2*d.*

2. There is a certain Debt payable 10 Months hence; but I agree with the Debtor to pay me down 149*l.* 13*s.* 0*d.* 3*qrs.* and allow him 5 *per cent.* for preſent Payment; I demand how much the Debt is? *Anſw.* 161*l.* 10*s.*

3. A Legacy was left me the 24th of *July* 1743, to be paid on the *Chriſtmas-day* following, but I agree with the Executor, and allow him 6 *per cent.* for the preſent Payment of 795*l.* 3*s.* 0*d.* 3*qrs.* I demand what the Legacy was? *Anſw.* 1000*l.*

CASE 3.

Q. *When* S, P *and* R *are given to find* T, *how is it diſcovered?*

A. Thus; $\frac{s-p}{rp}=t$.

EXAMPLES.

EXAMPLES.

1. The preſent Worth of 795*l.* 11*s.* 2*d.* for a certain Time to come, is 754*l.* 1*s.* 8*d.* at 6 *per cent.* I demand in what Time the firſt Sum ſhould have been paid, if no Rebate had been made? *Anſw.* 11 *Months.*

2. There is 161*l.* 10*s.* due at a certain Time to come, but I allow 5 *per cent* to the Debtor, for the preſent payment of 149*l.* 13*s.* 0*d.* 3*qrs.* I demand when the Sum ſhould have been paid without any Rebate? *Anſw.* 19 *Months.*

3. I have received 975*l.* 3*s.* 0*d.* 3*qrs*: for a Legacy of 1000*l.* allowing the Executor 6 *per cent.* I demand when the Legacy was payable, without Rebate? *Anſw.* 155 *Days.*

CASE 4.

Q. *When* S, P *and* T *are given to find* R, *how is it diſcovered?*

As Thus; $\frac{s-p}{tp}=r$.

EXAMPLES.

1. At what Rate *per cent.* will 795*l.* 11*s.* 2*d.* payable 11 Months hence, produce 754*l.* 1*s.* 8*d.* for preſent payment? *Anſw.* 6 *per cent.*

2. At what Rate *per cent.* will 161*l.* 10*s.* payable 19 Months hence, produce the preſent payment of 149*l.* 13*s.* 0*d.* 3*qrs.* *Anſw.* 5 *per cent.*

3. Suppoſe a Legacy of 1000*l.* is left me the 24th of *July* 1763. to be paid on the *Chriſtmas-day* following; but I agree with the Executor for the preſent payment of 975*l.* 3*s.* 0*d.* 3*qrs.* I demand the Rate *per cent.* allowed for his Money? *Anſw* 6 *per cent.*

Of EQUATION *of* PAYMENTS.

The True Way.

Q. *How is the* equated Time *for the Payment of a Sum of Money, due at ſeveral* times, *ſound out?*

A. Thus; 1 Find the *preſent Worth* of each Payment for its reſpective *Time*, as in *Rebate*; that is,

$$\frac{s}{tr+1}=p.$$

2. Add all the *preſent Worths* together, and call that Sum alſo *P*; then is $s-p=d$ the *Rebate.*

3. $\frac{d}{pr}=t$ is the true equated *Time.*

EXAMPLES.

EXAMPLES.

1. *A* owes *B* 200*l.* to be paid as follows, *viz.* 100*l.* at 2 Months, and 100*l.* at 4 Months; but they agree to have but one Payment of the Whole, Rebate being made at 6 *per cent.* I demand the true equated Time? *Anſw.* 3 *Months.*

2. A Merchant hath owing him 300*l.* to be paid as follows; 50*l.* at 2 Months, 100*l.* at 5 Months, and the reſt at 8 Months, and it is agreed to have but one Payment of the Whole, Rebate being made at 5 *per cent.* I demand the equated Time? *Anſw.* 5.9796 *Months.*

3. *F* owes to *H* 1000*l.* whereof 200*l.* is to be paid preſent, 400*l.* at 5 Months, and the reſt at 10 Months; but they agree to have but one Payment of the Whole, at the Rate of 4 *per cent.* Rebate; I demand the true equated Time? *Anſw.* 181 *Days.*

4. A Man owes to a Merchant 1200*l.* to be paid as follows, 200*l.* down, 500*l.* at the End of 10 Months, and the reſt at the End of 20 Months, and they agree to have but one Payment of the Whole, Rebate at 3 *per cent.* I demand the true equated Time? *Anſw.* 1 *Year,* 11 *Days.*

Of COMPOUND INTEREST.

Q. WHAT *particular* Letters *are here uſed ?*

A. Theſe?

P. the *Principal.*

T. the *Time.*

R. the Amount of 1*l.* for 1 Year, at any given Rate.

A. the *Amount.*

Q. *How is the* Amount of 1*l.* *for* 1 Year, *at any propoſed Rate* per cent. found?

A. Thus;

As 100 : 106 : : 1 : 1.06

100 : 105 : : 1 : 1.05, *&c.*

A TABLE *of the* AMOUNTS *of* 1*l.* *for* 1 *Year.*

Rate per Ct	*Amts of l.*	*Rate per Ct*	*Amts. of 1l.*
2	1.02	6½	1.065
3	1.03	7	1.07
3½	1.035	7½	1.075
4	1.04	8	1.08
4½	1.045	8½	1.085
5	1.05	9	1.09
5½	1.055	9½	1.095
6	1.06	10	1.1

CASE 1.

Q. *When* **P, T** *and* **R** *are given to find* **A,** *how is it diſcovered?*

A. Thus; $p \times r^t = a$

EXAMPLES.

1. What Sum will 450*l.* amount to in 3 Years time at 5 *per cent. per ann?* *Anſw.* 520*l.* 18*s.* 7*d* 2*qrs.*

2. What will 400*l* amount to in 4 Years at 6 *per cent per ann?* *Anſw.* 504*l.* 19*s.* 9*d* 3.15264*qrs.*

3. What will 480*l* amount to in 6 Years at 5 *per cent. per ann?* *Anſw.* 643*l* 4*s.* 11.0178*d.*

4. What is the amount of 500*l.* at $4\frac{1}{2}$ *per cent. per ann.* for 4 Years? *Anſw.* 590*l.* 11*s.* 5*d.* 2 95+*qrs*

CASE 2.

Q *When* **A,** R *and* T *are given to find* P, *how is it diſcovered?*

A. Thus $\frac{a}{r^t} = p$

EXAMPLES.

1. What Principal muſt be put to Intereſt to amount to the Sum of 520*l.* 18*s.* 7*d.* 2*qrs.* in 3 Years, at 5 *per cent. per ann?* *Anſw.* 450*l.*

2. What Principal will amount to 504*l* 19*s.* 9*d.* 3.15264*qrs* in 4 Years, at 6 *per cent per ann?* *Anſw.* 400*l.*

3. What Principal will amount to 643*l.* 4*s.* 11.0178*d.* in 6 Years, at 5 *per cent. per ann?* *Anſw.* 480*l.*

4 What Principal will amount to 590*l.* 11*s.* 5*d.* 3*qrs.* in 4 Years, at $4\frac{1}{2}$ *per cent. per ann?* *Anſw.* 500*l.*

CASE 3.

Q. *When* **P,** R *and* **A** *are given to find* **T,** *how is it diſcovered?*

A. Thus; $\frac{a}{p} = r^t$ which being continually divided by *r*, till nothing remain, the Number of thoſe Diviſions will be $= t$.

EXAMPLES.

1. In what Time will 450*l* amount to 520*l.* 18*s.* 7*d.* 2*qrs.* at 5 *per cent. per ann?* *Anſw.* 3 *Years.*

2. In what Time will 400*l* amount to 504*l.* 19*s.* 9*d.* 3.2*qrs* at 6 *per cent. per ann?* *Anſw* 4 *Years.*

3. In what Time will 480*l.* amount to 643*l.* 4*s.* 11.1*d.* at 5 *per cent. per ann?* *Anſw.* 6 *Years.*

4. In what Time will 500*l.* amount to 590*l.* 11*s.* 5*d.* 3*qrs.* at 4½ *per cent. per ann?* *Anſw.* 4 *Years.*

CASE 4.

Q. *When* P, A *and* T *are given to find* R; *how is it diſcovered?*

A. Thus; $\frac{a}{p} = r$ which muſt be extracted by the Rules of Extraction; the Time given in the Queſtion $= t$, ſhewing the Power.

EXAMPLES.

1. At what Rate *per cent.* will 450*l.* amount to 520*l.* 18*s.* 7*d.* 2*qrs.* in 3 Years? *Anſw.* 5 *per cent.*

2. At what Rate *per cent* will 400*l.* amount to 504*l.* 19*s.* 9*d.* 3.2*qrs.* in 4 Years? *Anſw.* 6 *per cent.*

3. At what Rate *per cent.* will 480*l.* amount to 643*l.* 4*s.* 11.1*d.* in 6 Years? *Anſw.* 5 *per cent.*

4. At what Rate *per cent.* will 500*l.* amount to 590*l.* 11*s.* 5*d.* 3*qrs.* in 4 Years? *Anſw.* 4½ *per cent.*

Of ANNUITIES *or* PENSIONS *in* ARREARS.

CASE 1.

Note U *repreſents the* Annuity, Penſion, *&c.* T, R, *and* A, *as before*

Q. *When* U, T *and* R *are given to find* A, *how is it diſcovered?*

A. Thus $\frac{ur^{t}-u}{r-1}=a$.

EXAMPLES.

1. What will an Annuity of 30*l.* *per ann.* payable yearly, amount to in 4 Years, at 5 *per cent?* *Anſw.* 129*l.* 6*s.* 0*d.* 3.6 *qrs.*

2 Suppoſe a Penſion of 50*l.* *per ann.* payable yearly, be granted to a ſuperannuated Officer; what is the Amount for 5 Years Forbearance, at 4 *per cent?* *Anſw.* 270*l.* 16*s.* 3*d.* 3.4+*qrs.*

3. If the yearly Rent of an Houſe, which is 40*l.* be forborn 7 Years, at 6 *per cent.* what is the Amount? *Anſw.* 335*l.* 15*s.* 0*d.* 3.3+*qrs.*

4. If a Salary of 35*l.* *per ann.* to be paid yearly, be omitted for 6 Years at 5½ *per cent.* what is the Amount? *Anſw.* 241*l.* 1*s.* 7*d.* 2.5+*qrs.*

CASE 2.

Q. *When* R, T *and* A *are given to find* U, *how is it diſcovered?*

A. Thus $\frac{ra-a}{r^t-1}=u$

EXAMPLES.

1. What Annuity being forborn for 4 Years will amount to 129*l.* 6*s.* 1*d.* at 5 *per cent?* *Anſw.* 30*l. per ann.*

2. If a Penſion being forborn for 5 Years at 4 *per cent. per ann.* amount to 270*l.* 16*s.* 4*d.* I demand how much it is *per ann?* *Anſw.* 50*l. per ann.*

3. If the yearly Rent of an Houſe being forborn for 7 Years at 6 *per cent.* amount to 335*l.* 15*s.* 0*d.* 3.4*qrs.* I demand what the Rent is? *Anſw.* 40*l. per ann.*

4. If the Payment of a Salary be omitted 6 Years, I demand how much the Salary is, when the Amount is 241*l.* 1*s.* 7*d.* 2.6*qrs.* at 5½ *per cent?* *Anſw.* 35*l.*

CASE 3.

Q. *When* U, A *and* R *are given to find* T, *how is it diſcovered?*

A. Thus $\frac{ar+u-a}{u}=r^t$ which being continually divided by *r*, till nothing remain, the Number of thoſe Diviſions will be $=t$.

EXAMPLES.

1. In what time will 30*l. per ann.* amount to 129*l.* 6*s.* 1*d.* allowing 5 *per cent.* for the Forbearance of Payment. *Anſw.* 4 *Years.*

2. In what time will a Penſion of 50*l. per ann.* amount to 270*l.* 16*s.* 4*d.* at 4 *per cent?* *Anſw.* 5 *Years.*

3. In what time will the yearly Rent of a Houſe, being 40*l. per ann* amount to 335*l.* 15*s.* 1*d.* at 6 *per cent.* for Non-payment? *Anſw.* 7 *Years.*

4. In what Time will a Salary of 35*l. per ann.* amount to 241*l.* 1*s.* 7*d.* 2.6*qrs.* at 5½ *per cent* for the Forbearance of Payment? *Anſw.* 6 *Years.*

Note, *In* this *and the two next* Sections *might be placed* Caſe 4; *but becauſe they require an* Algebraic Method *of proceeding, in order to find* R, *I omit inſerting it in its Place*; this *being deſigned to treat only of* Numbers.

Of the PRESENT WORTH *of* ANNUITIES, PENSIONS, *&c.*

Note, P, *is the* preſent Worth, U, R *and* T *as in the laſt.*

CASE 1.

Q. *When* U, T *and* R *are given to find* P; *how is it diſcovered?*

$$u - \frac{u}{t}$$

A. Thus; $\frac{r}{r-1}=p.$

EXAMPLES.

1. What is the yearly Rent of 20*l.* to continue 6 Years, worth in Ready Money, at 5 *per cent?* *Anſw.* 101*l.* 10*s.* 3*d.* 3*qrs.*

2. What muſt be the Diſcount of a Leaſe of 50*l. per ann.* when preſent Payment is made for 4 Years, at 3 *per cent?* *Anſw.* 14*l.* 2*s.* 10*d.* 2*qrs.*

3. An Houſe is let upon Leaſe for 4 Years at 70*l. per ann.* and the Leſſee is deſirous to make preſent Payment, provided the Leſſor will allow him 5¼ *per cent.* I demand how much muſt be paid down, and how much diſcounted?

Anſw. { 243*l.* 19*s.* 0*d.* 3*qrs.* to be paid down.
{ 36*l.* 0*s.* 11*d.* ¼*qr.* to be diſcounted.

4. What is the preſent Worth of a Penſion of 30*l. per ann.* for 5 Years, at 4 *per cent?* *Anſw.* 133*l.* 11*s.* 1*d.*

CASE 2.

Q. *When* P, T *and* R *are given to find* U, *how is it diſcovered?*

A. Thus, $\frac{\sqrt{pr^t \times r - pr^t}}{r^t 1 -}=u.$

EXAMPLES.

1. What Annuity or yearly Rent to continue 6 Years, may be purchaſed for 101*l.* 10*s.* 3*d.* 3*qrs.* at 5 *per cent?* *Anſw.* 20*l. per ann.*

2. Suppoſe the preſent Payment of 133*l.* 11*s.* 1*d.* were required for a Penſion for 5 Years to come at 4 *per cent.* what is that Penſion? *Anſw.* 30*l. per ann.*

3. If the preſent Payment of 185*l* 17*s*. 1*d*. 2*qrs*, be made for the Leaſe of an Houſe, 4 Years to come at 3 *per cent*. what is the yearly Rent? *Anſw*. 50*l*. *per ann*.

4. If an Houſe is let upon Leaſe for 4 Years, and the Leſſee makes preſent Payment of 243*l*. 19*s*. 0*d*. 3*qrs*. for that Time ot 5¼ *per cent*. what is the yearly Rent of that Houſe? *Anſw*. 70*l*. *per ann*.

CASE 3.

Q. *When* U, P *and* R *are given to find* T, *how is it diſcovered?*

A. Thus $\frac{u}{p+u-pr}=r^{t}$ which being continually divided by *r*, till nothing remain, the Number of thoſe Diviſions will be $=t$.

EXAMPLES.

12. How long may a Leaſe of 20*l*. yearly Rent be had for 101*l*. 10*s*· 3*d*. 3*qrs*. allowing 5 *per cent*. to the Purchaſer? *Anſw*. 6 *Years*.

2. I demand what time a Leaſe of 30*l*. *per ann*. may be purchaſed for, when preſent Payment of 133*l*. 11*s*. 1*d*. is made at 4 *per cent?* *Anſw*. 5 *Years*.

3. If 185*l*. 17*s*. 1*d*. 2*qrs*. be paid down for a Leaſe of 50*l*. *per ann*. at 3 *per cent*. how long is the Leaſe purchaſed for? *Anſw*. 4 *Years*.

4. An Houſe is let upon Leaſe for 70*l*. *per ann*. and the Leſſee makes preſent Payment of 243*l*. 19*s*. 0*d*. 3*qrs*. he being allowed 5¼ *per cent*. I demand how long the Leaſe is purchaſed for? *Anſw*. 4 *Years*.

Of ANNUITIES, LEASES, *&c*. *taken in* REVERSION.

CASE 1.

Q. *How many* Operations *are there in* Caſe 1?

A. Two.

Q. *What is the* Firſt?

A. Find the *preſent Worth* of the yearly *Sum* at the given *Rate*, and for the given *Time* of its Continuance, to do which there are given *U*, *T* and *R* to find *P*.

Q. *How is* P *diſcovered?*

A. Thus; $\frac{vr^{t}-v}{r^{t}\times r-r^{t}}=p$.

Q 3

Q. *What is the* Second?

A. Find what *Principal* being put to Intereſt will amount to *P*, at the ſame *Rate*, and for the *Time* to come before the *Annuity* commences, and that will be the *preſent Worth* of the Annuity, &c. in *Reverſion*; therefore let *P* be changed into *A*= the Amount, and then there will be given *A*, *R* and *T*, to find *P*, or the *Principal*.

Q. *How is* P *diſcovered?*

A. Thus $\frac{a}{r^t}=p$.

EXAMPLES.

1. What is the preſent Worth of the Reverſion of a Leaſe of 20*l.* *per ann.* to continue 4 Years, but not to commence till the End of two Years, allowing 5 *per cent.* to the Purchaſer? *Anſw.* 64*l.* 6*s.* 6*d.* 1 4+*qr.*

2. There is a Leaſe of certain Lands worth 32*l.* *per ann.* which is yet in being for 4 Years, and the Leſſee is deſirous to take a Leaſe in Reverſion for 7 Years to begin when the old Leaſe is expired; I demand the preſent Worth of the ſaid Leaſe in Reverſion, allowing 5 *per cent.* to the Purchaſer? *Anſw.* 152*l.* 6*s.* 8*d.* 2*qrs.*+

3. There is an Houſe now building which I have a mind to take a Leaſe of for 8 Years: but the Houſe will not be finiſhed within 2 Years; I demand how much I muſt pay down, when the yearly Rent is 100*l.* and the Landlord allows me 4 *per cent.* on preſent Payment? *Anſw.* 622*l.* 9*s.* 7.2*d.*

CASE 2.

Q. *How many* Operations *are there in* Caſe 2?

A. Two

Q. *What is the* Firſt?

A. Find the Amount of the preſent Worth of the yearly Sum at the given *Rate*, and for the *Time* before the Annuity commences, to do which there are given *P*, *R* and *T*, to find *A*.

Q. *How is* A *diſcovered?*

A. Thus, $pr^t=a$

Q. *What is the* Second?

A. Find what yearly Rent being ſold will produce *A* for the *preſent Worth*, at the ſame Rate, and for the Time of its Continuance, and that will be the yearly *Sum* required: Therefore let *A* be changed into *P*, and then there will be given *P*, *R* and *T* to find *U*, or the yearly *Sum*.

Q. *How is* U *diſcovered?*

A. Thus, $\sqrt{\frac{pr^{t}\times r-pr}{r^{t}-1}t}=u$.

EXAMPLES.

1. What Annuity or yearly Rent to be enter'd upon 2 Years hence, and then to continue 4 Years, may be purchaſed for 64*l.* 6*s.* 6*d.* 2*qrs.* ready Money at 5 *per cent?* *Anſw.* 20*l. per ann.*

2. There is a Leaſe of certain Lands in being for 4 Years, and the Leſſee being minded to take a Leaſe in Reverſion for 7 Years, to begin when the old Leaſe ſhall be expired, laid down 152*l.* 6*s.* 8*d.* 2*qrs.* I demand the yearly Rent of the ſaid Lands, when Allowance was made to the Leſſee at 5 *per cent?* *Anſw.* 32*l. per ann.*

3. The preſent Payment for the Leaſe of an Houſe is 622*l.* 9*s.* 7.2*d.* now I have taken a Leaſe in Reverſion for 8 Years, which is to commence at the End of two Years; I demand how much the yearly Rent is, when for the ſaid preſent Payment I was allowed 4 *per cent?* *Anſw.* 100*l. per ann.*

CASE 3.

Q. *How many* Operations *are there in* Caſe 3?

A. Two.

Q. *What is the* Firſt?

A. Find the Amount of the preſent Worth of the yearly Sum at the given Rate, and for the Time before the Annuity, *&c.* commences; to do which there are given *P*, *R* and *T*, to find *A*, as in *Caſe* 2.

Q. *How is* A *diſcovered?*

A. Thus, $pr^{t}=a$.

Q. *What is the* ſecond Operation?

A. Find what Time the yearly Rent given being ſold for will produce *A* for the preſent Worth, at the ſame Rate, and that will be the Time required: Therefore change *A* into *P*, and then there will be given *U*, *P* and *R* to find *T*, as in *Caſe* 3, *Page* 157.

Q. *How is* T *diſcovered?*

A. Thus, $\frac{u}{p+u-pr}=r^{t}$ which being continually divided by *r*, till nothing remains, the Number of thoſe Diviſions will be=*t*.

EXAMPLES.

EXAMPLES.

1. The preſent Worth of a certain Leaſe in Reverſion is 64*l.* 6*s.* 6*d.* 2*qrs.* the Leaſe is 20*l. per ann.* and commences 2 Years hence, and the Allowance to the Purchaſer is 5 *per cent.* I demrnd the Time of its Continuance? *Anſw.* 4 *Years.*

2. A certain Man took a Leaſe of ſome Lands for a Time, which by Agreement was not to commence till the Expiration of 4 Years, the yearly Rent was 32*l.* it was alſo agreed that the Purchaſer ſhould lay down 152*l.* 6*s.* 8*d.* 2*qrs.* and be allowed for his preſent Payment 5 *per cent.* I demand the Time that the Leaſe was taken for? *Anſw.* 7 *Years.*

3. The preſent Payment for the Leaſe of an Houſe is 622*l.* 9*s.* 7.2*d.* and the yearly Rent is 100*l.* now I have taken a Leaſe in Reverſion, which is to commence at the End of 2 Years, I demand the Length of the Leaſe, when I was allow'd 4 *per cent.* for my Money? *Anſw.* 8 *Years.*

Of purchaſing FREEHOLD *or* REAL ESTATES.

Q. *What do you underſtand by a* Real *or* Freehold Eſtate?
A. Such as are bought to continue for ever.

Note, U *repreſents the* yearly Rent, R *the* Amount *of* 1*l.* &c. *and* P *the* preſent Worth.

CASE 1.

Q. *When* U and R *are given to find* P, *how is it diſcovered?*

A. Thus; $\frac{u}{r-1}=p.$

EXAMPLES.

1. Suppoſe a Freehold Eſtate of 40*l. per ann* is to be ſold: what is it worth, allowing the Buyer 5 *per cent.* for his Money? *Anſw.* 800*l.*

2. What is an Eſtate of 290*l. per ann.* to continue for ever worth in preſent Money, allowing 4 *per cent.* to the Buyer? *Anſw* 7250*l.*

CASE 2.

Q. *When* P *and* R *are given to find* U, *how is it diſcovered?*

A. Thus, $\sqrt{p\times r-1}=u.$

EXAMPLES.

EXAMPLES.

1. If a Freehold Eſtate is bought for 800*l.* and the Allowance of 5 *per cent.* is made to the Buyer; I demand the yearly Rent? *Anſw.* 40*l. per ann.*

2. If an Eſtate be ſold for 7250*l.* preſent Money, and 4 *per cent.* is allowed to the Buyer for the ſame; I demand the yearly Rent? *Anſw.* 290*l. per ann.*

CASE 3.

Q. *When* P *and* U *are given to find* R *how is it diſcovered?*

A. Thus $\frac{p+u}{p}=r$.

EXAMPLES.

1. If a Real Eſtate of 40*l. per ann.* be ſold for 800*l.* I demand the Rate *per cent?* *Anſw.* 5 *per cent.*

2. If a Freehold Eſtate of 290*l. per ann.* be bought for 7250*l.* I demand the Rate *per cent?* *Anſw.* 4 *per cent.*

Of purchaſing FREEHOLD ESTATES *in* REVERSION.

CASE 1.

Q. *How many* Operations *are there in* Caſe 1?

A. Two

Q. *What is the* Firſt?

A. Find the *preſent Worth* of the yearly Sum at the given *Rate*, to do which there are given *U* and *R* to find *P*.

Q. *How is* P *diſcovered?*

A. Thus; $\frac{u}{r-1}=p$.

Q. *What is the* ſecond Operation?

A. Find what *Principal* being put to *Intereſt* will amount to *P* at the ſame *Rate*, and for the *Time* to come before the Eſtate commences, and that will be the *preſent Worth* of the Eſtate in *Reverſion*: Therefore let *X* be changed into *A*= the Amount, and then there will be given *A*, *R* and *T* to find *P*=the *Principal?*

Q. *How is* P *diſcovered?*

A. Thus $\frac{a}{r^t}=p$.

EXAMPLES.

1. Suppoſe a Freehold Eſtate of 40*l. per ann.* to commence 3 Years hence, is to be ſold, what is it worth allowing the Purchaſer 5 *per cent.* for his preſent Payment? *Anſw.* 691*l.* 1*s.* 4*d.* 3*qrs.*+

2. What is an Eſtate of 290*l. per ann.* to continue for ever, but not to commence till the Expiration of 4 Years, worth in preſent Money, Allowance being made at 4 *per cent*? *Anſw.* 6197*l.* 6*s.* 5*d.* 2*qrs.*+

CASE 2.

Q. *How many* Operations *are there in* Caſe 2?

A. Two.

Q. *What is the* Firſt?

A. Find the Amount of the *preſent Worth* of the yearly Rent at the given *Rate*, and for the *Time* before the Eſtate commences; to do which there are given *P*, *T* and *R* to find *A*.

Q. *How is* A *diſcovered?*

A. Thus; $pr^t = a$.

Q. *What is the* ſecond Operation?

A. Find what yearly Rent being ſold will produce *A* for the *preſent Worth*, at the ſame *Rate*, and that will be the yearly Sum required: Therefore let *A* be changed into *P*, and then there will be given *P* and *R* to find *U*, or the yearly *Sum*.

Q. *How is* U *diſcovered?*

A. Thus, $\sqrt{\frac{pr \times r - pr}{r}} = u$.

EXAMPLES.

1. Suppoſe a Freehold Eſtate, to commence 3 Years hence, is ſold for 691*l.* 1*s.* 5*d.* allowing to the Purchaſer 5 *per cent.* I demand the yearly Income? *Anſw.* 40*l. per ann.*

2. There is a certain Freehold Eſtate bought for 6197*l.* 6*s.* 5*d.* 2*qrs* which does not commence till the Expiration of 4 Years, the Buyer allow'd 4 *per cent.* for his Money; I demand the yearly Income? *Anſw.* 290*l. per ann.*

Of REBATE *or* DISCOUNT.

Q. *What particular* Letters *are uſed here?*

A. Theſe;

S, the *Sum* to be diſcounted for;

P, the *preſent Worth* of that Sum, due at any Time to come;

T, the *Time* before it becomes due;

R, the *Amount* of 1*l.* for 1 Years, at any Rate *per cent.*

CASE 1.

Q. *When* S, T *and* R *are given to find* P; *how is it diſcovered?*

A. Thus $\frac{s}{r^t}=p$.

EXAMPLES.

1. What is the preſent Worth of 520*l.* 18*s.* 7*d.* 2*qrs.* payable 3 Years hence, at 5 *per cent?* *Anſw.* 450*l.*

2. There is a Debt of 504*l.* 19*s* 9*d.* 3*qrs.* which is not due until 4 Years hence, but it is agreed to be paid in preſent Money; what Sum muſt the Creditor receive, allowing the Rebate of 6 *per cent.* to the Debtor for his Money? *Anſw.* 400*l.*

3. If 643*l.* 4*s* 11*d.* be payable in 6 Years time, what is the preſent Worth, Rebate being made at 5 *per cent?* *Anſw.* 480*l*

CASE 2.

Q. *When* P, T *and* R *are given to find* S, *how is it diſcovered?*

A. Thus; $p\times r^t=s$.

EXAMPLES.

1. If 450*l.* be received for a Debt, payable 3 Years hence, and an Allowance of 5 *per cent.* was made to the Debtor for his preſent Payment; I demand what the Debt was? *Anſw.* 520*l.* 18*s.* 7*d.* 2*qrs.*

2. There is a Sum of Money due at the Expiration of 4 Years, but the Creditors agrees to take 400*l.* down, allowing 6 *per cent.* on preſent Paynent; I demand what the Debt was? *Anſw.* 504*l.* 19*s.* 9*d.* 3*qrs.*

3. If a Sum of Money, due 6 Years hence, produces 480*l.* for preſent Payment, Rebate being made at 5 *per cent.* I demand how much the Debt was? *Anſw.* 643*l.* 4*s.* 11*d.*

CASE 3.

Q. *When* S, P *and* R *are given to find* T, *how is it diſcovered?*

A. Thus, $\frac{s}{p}=r^t$ $\left\{\right.$ which being continually divided by *r*, till nothing remain, the Number of thoſe Diviſions will be $=t$.

EXAMPLES.

EXAMPLES.

1. A certain Man received 450*l.* down for a Debt of 520*l.* 18*s.* 7*d.* 2*qrs.* Rebate being made at 5 *per cent.* I demand in what time the Debt was payable? *Anſw* 3 *Years.*

2. There is a Debt of 504*l.* 19*s.* 9*d.* 3*qrs.* payable at a certain Time; but it is agreed to pay 400*l.* down at the Allowance of 6 *per cent.* to the Debtor for his preſent Money; I demand in what Time the Debt would become due, if no ſuch Payment were to be made? *Anſw.* 4 *Years*

3 The preſent Payment of 480*l.* is made for a Debt of 643*l.* 4*s.* 11*d.* Rebate at 5 *per cent.* I demand when the Debt was payable? *Anſw.* 6 *Years.*

CASE 4.

Q. *When* S, P *and* T *are given to find* R, *how is it diſcovered?*

A. Thus; $\frac{s}{p}=r^t$ $\left\{\right.$ which muſt be extracted by the Rules of Extraction; the Time given in the Queſtion=*t*, ſhewing the Power.

EXAMPLES.

1. The preſent Worth of 520*l.* 18*s.* 7*d.* 2*qrs.* payable 3 Years hence, is 450*l.* I demand at what Rate *per cent.* Rebate was made? *Anſw.* 5 *per cent.*

2. A Debt of 504*l.* 19*s.* 9*d.* 3*qrs.* is due 4 Years hence, but it is agreed to take 400*l.* down; the Queſtion is, what was the Rate *per cent.* that the Rebate was made at? *Anſw.* 6 *per cent.*

3. The Sum of 643*l.* 4*s.* 11*d.* is payable in 6 Years time; and the preſent Worth of that Sum is 480*l*, I demand at what Rate *per cent.* muſt Rebate be made, to produce the ſaid preſent Worth? *Anſw.* 5 *per cent.*

Note 1. Equation *of* Payments *at* Compound Intereſt *ſhould follow next; but as that* Rule *is beſt done by the* Logarithms, *the kind Reader will, I hope, take this as a ſufficient* Reaſon *for not placing it here.*

2. *The whole Buſineſs of* Compound Intereſt, *is better performed by the* Logarithms *or by* Tables *calculated for that Purpoſe, than otherwiſe; eſpecially when the* Time *given is very long, as for* 20, 30 *or* 40 Years, *and when the* Payments *are to be made* half-yearly *or* quarterly. *What is here done ſerves only for* whole Years, *and ſhews what can be done by the* Pen, *where the* Logarithms *or* Tables *are wanting.*

THE

School-maſter's Aſſiſtant.

PART IV.

A Collection of QUESTIONS *to exerciſe the foregoing* RULES.

1. WRITE down nine hundred Millions, ſeven Hundred ſixty Thouſand, and Twenty-one.

2. What muſt 20*s.* pay towards a Tax, when 326*l.* 6*s.* 8*d.* is aſſeſſed, at 41*l.* 16*s.* 2*d*, *Anſw.* 2*s.* 6*d.* 2*qrs.* $\frac{77600}{78320}$.

3. If the $\frac{1}{3}$ of 6 be 3; what ſhall the $\frac{1}{4}$ of 20 be? *Anſw.* 7$\frac{1}{2}$.

4. I demand the Sum of 1748 added to itſelf? *Anſw.* 3496.

5. I demand the Product of 76 multiplied by itſelf? *Anſw.* 5776.

6. I demand the Difference between 14676 and the Fourth of itſelf? *Anſw.* 11007.

7. I demand the Quotient of the Square of 476 divided by the half of its Root? *Anſw.* 952.

8. There is in 3 Bags the Sum of 1468*l.* *viz.* in the firſt Bag 461*l.* in the ſecond 581*l.* I demand what was in the third Bag? *Anſw.* 426*l.*

9. What Number is that which being multiplied by 13 the Product will be 221*l.*? *Anſw.* 17.

10. Two Perſons, *A* and *B* owe ſeveral Debts; the leſſer Debt being that of *A*, is 2173*l.* the Difference is 371*l.* what is the Debt of *B*? *Anſw.* 2544*l.*

11. A Captain and 160 Sailors took a Prize worth 1360*l.* of which the Captain had $\frac{1}{5}$ for his Share, and the reſt was equally divided among the Sailors: what was each Man's Part? *Anſw. The Captain had* 272*l.* *and each Sailor had* 6*l.* 16*s.*

12. An ancient Lady being demanded how old ſhe was; to avoid a direct Anſwer ſaid, I have 9 Children, and there are 3 Years between the Birth of each of them: The eldeſt was born when I was 19 Years old, which is now exactly the Age of the youngeſt; how old was the Lady? *Anſw.* 62 *Years old.*

13. What Number is that from which if you taſte 341, the Remainder will be 726? *Anſw.* 1067.

14. What Number is that which being added to 168 makes the Sum to be 706? *Anſw.* 538.

15. What Number is that which being divided by 19 the Quotient will be 72? *Anſw.* 1368.

16. A Broker bought for his Principal, in the Year 1720, 400*l.* Capital Stock in the *South Sea,* at 650 *per cent.* and ſold it again when it was worth but 130 *per cent.* how much was loſt in the Whole? *Anſw.* 2080*l.*

17. The Sum of two Numbers is 4139, their Difference is 948; what is the leſſer Number? *Anſw.* 3191.

18. A Gentleman went to Sea at 17 Years of Age, 8 Years after that he had a Son born, who lived 46 Years, and died before his Father, after whom the Father lived twice 20 Years, and then died alſo; I demand the Age of the Father when he died? *Anſw.* 111 *Years.*

19. Three Gardiners, *A, B* and *C,* having bought a Piece of Ground, find the Profits of it to amount to 120*l.* *per annum*; now the Sum of Money which they laid down was in ſuch proportion, that as often as *A* paid 5*l.* *B* paid 7*l.* and as often as *A* paid 4*l,* *C* paid 6*l.* I demand how much each Man muſt have *per ann.* of the Gain?

		l.	*s.*	*d.*
Anſw.	A	26	13	4
	B	37	6	8
	C	56	0	0
		120	0	0

20. *A. B* and *C* freight a Ship with Wine, *viz A* lays out 1342*l.* *B* 1178*l.* *C* 630*l.* the whole 212 Tuns are ſold at 32*l.* *per* Tun; what ſhall each Man receive?

		l.	*s.*	*d*	*q.*
Anſw.	A	2890	3	11	$3\frac{1230}{3150}$
	B	2537$_{3}\frac{2}{15}$0			
	C	1356	16	0	

21. *A, B* and *C* made up a Stock of 1000*l.* whereof *A* put in 409*l.* *B* 198*l.* and they improved it to 1964*l.* I demand what was the Stock of *C,* and what was each Man's Share of the whole Gain?

	l.	*s.*	*d.*
Anſw. C's *Stock was*	393	0	0
A's *Share was*	803	5	$6\frac{240}{1000}$
B's - - - - - -	388	17	$5\frac{280}{1000}$
C's - - - - - -	771	17	$0\frac{480}{1000}$

22. *A, B* and *C* freight a Ship for the *Canaries,* worth 3696*l.* whereof *A* put in 369*l.* *B* 897*l.* but by reaſon of a Storm, one Third of the Goods was caſt over board; I demand each Man's Share of the Loſs?

	l.
Anſw. A's *Loſs was*	123
B's - - - - - -	299
C's - - - - - -	810

23. *A, B* and *C* traded together and gained 100*l.* *A* put in 640*l.* *B* put in ſo much that he muſt receive 60*l.* of the Gain; I demand how much *B* put in? *Anſw.* 960*l.*

24. What is the Value of 27 Dozen 10℔ of Candles, at 5*d. per* ℔? *Anſw.* 6*l.* 19*s* 2*d.*

25. Bought 28*qrs.* 2 *buſh* of Wheat, at 4*s.* 6*d. per* Buſhel; what is the Worth of it? *Anſw.* 50*l.* 17*s.*

26. If a Man earn 2*s.* 6*d.* 2*qrs. per* Day, how much is that for 19 Weeks, *Sundays* excepted? *Anſw.* 14*l.* 9*s.* 9*d.*

27. *A, B* and *C* traded together, the firſt laid I know not how much, *B* put in 20 Pieces of Cloth, and *C* put in 500*l.* and they have gained 1000*l* whereof *A* ought to have 350*l.* and *B* 400*l.* I demand *C*'s Share, how much the firſt Man laid in, and what the 20 Pieces of Cloth were worth?

	l.
Anſw. C's *Share was* - - -	250
A *laid in* - - - - -	700
B's *Cloth was worth*	800

28. *C* hath Candles at 6*s. per* Dozen ready Money, but in Barter he will have 6*s.* 6*d. per* Dozen; *D* hath Cotton at 9*d. per* ℔ ready Money; I demand what Price the Cotton muſt be at in Barter, alſo how much Cotton muſt be bartered for 100 Dozen of Candles? *Anſw. The Cotton muſt be at* 9*d.* 3*qrs.* per ℔ *in Barter*; *and* 7 *C.* 0*qr.* 16℔ *of Cotton muſt be given for* 100 *Dozen of Candles.*

21. How many Ducats muſt I deliver at *Venioe* to receive at *London* 178*l.* 2*s.* the Exchange being at 4*s.* 4*d.* *per* Ducat *Anſw.* 822 *Ducats.*

30. A Traveller would change 500 *French* Crowns at 4*s.* 6*d.* *per* Crown into Sterling Money; but he muſt pay a Halfpenny *per* Crown for change; how much muſt he receive? *Anſw.* 111*l* 9*s.* 2*d.*

31. When a Factor taketh 1*l.* *per cent.* for his Commiſſion, what muſt he have for 743*l.* 17*s.* 3*d?* *Anſw.* 7*l.* 8*s.* 9*d.* 1*qr.* $\frac{192}{2400}$.

32. Two Merchants in Company gained 100*l.* *A* laid in ſo much that for his Share of the Gain he muſt have 60*l.* *B* laid in 720 Ducats, at 6*s.* 8*d.* *per* Ducat; I demand how much *A* laid in, and what the Ducats were worth? *Anſw.* A *laid in* 360*l.* *and the Ducats were worth* 240*l.*

33. Two Merchants traded in Company, the firſt laid in 640*l.* and taketh $\frac{5}{8}$ of the Gain; I demand how much the ſecond Merchant laid in? *Anſw* 384*l.*

34. What Number is that which being multiplied by 15 the Product will be $\frac{3}{4}$? *Anſw.* $\frac{1}{20}$.

35. I demand the $\frac{5}{8}$ of 20 Shillings? *Anſw.* 12*s.* 6*d.*

36. What Fraction is that to which if you add $\frac{2}{5}$ the Sum will be $\frac{5}{6}$? *Anſw.* $\frac{13}{30}$.

37. What Number is that to which if you add $7\frac{2}{3}$ the Whole will be $12\frac{1}{4}$? *Anſw.* $4\frac{7}{12}$.

38. What Number is that from which if you take $\frac{4}{5}$ the Remainder will be $\frac{1}{8}$? *Anſw.* $\frac{29}{40}$.

39. What Number is that from which if you take $13\frac{1}{2}$ the Remainder will be $5\frac{5}{7}$? *Anſw.* $19\frac{3}{14}$.

40 What Number is that which being divided by $\frac{3}{4}$ the Quotient will be 21? *Anſw.* $15\frac{3}{4}$.

41. What Number is that which being multiplied by $\frac{2}{3}$ produceth $\frac{1}{4}$? *Anſw.* $\frac{3}{8}$.

42. What Number is that from which if you take $\frac{2}{5}$ of itſelf the Remainder will be 12? *Anſw.* 20.

43. What Part of 25 is $\frac{5}{8}$ of an Unit? *Anſw.* $\frac{1}{40}$.

44. What Number is that to which if you add its own $\frac{2}{3}$ the Whole ſhall be 20? *Anſw.* 12.

45. What Number is that which maketh 9 to be the $\frac{2}{3}$ of it? *Anſw.* $13\frac{1}{2}$.

46 If a Cannon may be diſcharged at twice with 6 ℔ of Powder; how many times will 7*C.* 3*qrs.* 17℔ diſcharge the ſame Piece? *Anſw.* 295 *times.*

47. If $\frac{3}{8}$ of a Ship be worth 3740*l.* what is the Whole worth? *Anſw.* 9973*l.* 6*s.* 8*d.*

48. A young Man received 210*l.* which was $\frac{2}{3}$ of his elder Brother's Portion; now three times the elder Brother's Portion was half of the Father's Eſtate; I demand how much the Eſtate was? *Anſw.* 1890*l.*

Oper. $210+\frac{1}{2}\ 210=315=$ *the elder Brother's Portion.*
$315\times3=945=$ *half of the Father's Eſtate.*

49. A Factor bought a certain Quantity of Broad Cloth and Drugget, which together coſt him 81*l.* The quantity of Broad Cloth that he bought was 50 Yards, at 18*s. per* Yard, and for every five Yards of Broad Cloth he had nine Yards of Drugget; I demand how many Yards of Drugget he had, and how much the Drugget coſt him *per* Yard? *Anſw.* 90 *Yards of Drugget at* 8*s. per Yard.*

Oper.
$\frac{50\times18}{20}=45$*l. the Price of the Broad Cloth.*
$\frac{50}{5}:\times9=90$ *Yards of Drugget*
$81-45=36$*l. the whole Price of the Drugget.*
yds. l. yd. s.
90 : 36 : : 1 : 8 *Price per Yard.*

50. A certain Uſurer lent out 90*l.* for 12 Months and received Principal and Intereſt 95*l.* 8*s.* I demand at what Rate *per cent.* he received Intereſt? *Anſw.* 6*l. per cent.*

51. Two men depart both from one place, the one goes *North* and the other *South*, the one goes 7 miles a Day, and the other 11 miles a Day; how far are they diſtant the 12th Day after their Departure? *Anſw.* 216 *Miles.*

52. A merchant bought 8 Tuns of Wine, which having received Damage he ſelleth for 400*l* and 12*l. per cent.* Loſs, I demand how much it coſt him *per* Tun, and how he ſold it *per* Gallon, to loſe after the ſaid Rate?

Anſw. *Coſt* - - 56*l.* 0*s.* 0*d. per Tun.*
Sold at 0*l.* 3*s.* 11*d.* 2*qrs.*$\frac{960}{2016}$ *per Gallon.*

Oper.
$4\times12=48$ *the whole Loſs.*
$12\times4+400=448$*l. the whole Coſt of the Wine.*
$\frac{448}{8}=56$*l. the Price per Tun.*
Tuns l. Gal. s. d. qrs.
8 ; 400 : : 1 : 3 11 2$\frac{960}{2016}$ *per Gallon.*

53. Two men depart both from one place, and both go the ſame Road, the one travels 12 miles every Day, the other 17 miles every Day; how far are they diſtant the tenth Day after their Departure? *Anſw.* 50 *Miles.*

54. If a Gentleman hath an Eſtate of 1000*l. per ann.* how much may he ſpend one Day with another, to lay up threeſcore Guineas at the Year's End? *Anſw.* 2*l.* 11*s.* 4*d.* $\frac{40}{365}$.

55. If 76℔ of Cinnamon Coſt 40*l.* 10*s.* 8*d.* and 1 *C.wt.* of Nutmegs 59*l.* 14*s.* 8*d.* I demand the Price of 3*oz.* one with another? *Anſw.* 2*s.*

56. A Grocer delivered 17*C.* 3*qrs.* 10℔ of Tobacco in the Roll to be cut and dried, and when it came home it held out 16*C.* 0*qr.* 14℔; I demand how much was loſt in every ℔, and alſo ſuppoſing it coſt in the Roll 8*d.* $\frac{6}{7}$ *per* ℔, and the cutting 1*d.* $\frac{5}{8}$ *per* ℔. I demand what it now ſtands him in?

Anſw. { Loſt *per* ℔ 1 *oz.* 8*dr.* $\frac{1200}{1998}$.
{ It ſtands him in 87*l.* 5*s.* 3*d.* 1*qr.* $\frac{16}{56}$.

57. If Tallow be ſold for 4*d. per* ℔, what is the Value of 3 Tubs, each 3*C.* 1*qr.* 10℔ Groſs, Tare *per* Tub 25*l*? *Anſw.* 17*l.* 9*s.*

58. Shipp'd from *Spain* 10 Tuns of Wine, at 10*l.* Sterling *per* Hhd. paid Cuſtom at the port of *London* 1*s. per* Gallon: The Charges for Lighterage, Cartage and Porterage amounted to 5*l.* afterwards, by misfortune of a Pipe ſtaving containing 126 Gallons, I loſt 59 Gallons, the next Day 28 Gallons more ran out, and the Remainder of the Pipe not being ſaleable, I threw it away: The market-price not running high, I ſold the reſt for 17*l. per* Hhd. I demand how much I gained or loſt by the Sale of the ſaid Wine? *Anſw. Gain'd* 115*l.*

59. A Ship's Company took a Prize of 300*l.* which is to be divided among them, according to their Pay, and the Time they have been on board; the Officers and midſhipmen 5 months, and the Sailors 3 months. The Officers, one with another, had 40*s per* month: The midſhipmen 30*s. per* month, and the Sailors 22*s.* There were 6 Officers, 12 midſhipmen, and 84 Sailors; what muſt each Party have of the Prize, and what each ſingle Perſon?

Anſw.	*l.*	*s,*	*d.*	*qrs.*	*each Man.*	*l.*	*s.*	*d.*	*gr.*
The Officers	144	4	7	1$\frac{224}{416}$		24	0	9	0+
Midſhipmen	108	3	5	2$\frac{64}{416}$		9	0	3	1+
Sailors - -	47	11	11	0$\frac{128}{416}$		0	11	3	3+

60. If 1000lb of Beef ſerve 240 men 8 Days, how many Pounds will ſerve 460 men 10 Weeks? *Anſw*. 16770lb 13oz. $\frac{640}{1920}$.

61. What is the Amount of 1000*l* for 5 Years and a half, at 4$\frac{3}{4}$ *per cent*. Simple Intereſt? *Anſw*. 1261*l*. 5*s*.

62. Sold Goods amounting to the Value of 700*l*. for 6 months; what is the preſent Worth, at 5 *per cent*. Simple Intereſt? *Anſw*. 682*l*. 19*s*. 5*d*. 2*qrs*.

63. A merchant bought 400 Cloths, at 12*l*. *per* Cloth, which he Shipped for *Spain*, to have returns from thence, the one half in Wine, at 30*l*. *per* Tun, and the other half in Rice, at 28*s*. *per C.wt*. I demand how much of each muſt be returned for the Cloths? *Anſw*. 80 *Tuns of Wine, and* 1714*C*. 1*qr*. 4lb *of Rice*.

64. A Tobacconiſt having ſeveral ſorts of Tobacco, *viz*. of 12*d*. *per* lb of 16*d*. *per* lb of 18*d* *per* lb and of 2*s*. *per* lb and he is deſirous to make a mixture of an *C*. *wt*. worth 20*d*. *per* lb I demand how much of each ſort muſt be taken?

	lb	*oz*.		*d per* lb
Anſw.	17	3 $\frac{18}{26}$	*at*	12
	17	3 $\frac{18}{26}$	*at*	16
	17	3 $\frac{18}{26}$	*at*	18
	60	4 $\frac{24}{26}$	*at*	24
	112			

65. A Brewer mixt 17 Gallons of Ale, at 8*d*. *per* Gallon, with 19 Gallons at 10*d*. *per* Gallon, and with 40 Gallons at 6*d*. *per* Gallon; I demand what one Gallon of this mixture is worth, and alſo the Worth of the whole Quantity?

Anſw. { 0*l*. 0*s*. 7*d*. 1*qr*. $\frac{60}{76}$ *per Gallon*.
{ 2*l*. 7*s*. 2*d*. *the Price of the whole Mixture*.

66. There are two Numbers, the one 48, the other twice as much; I demand the Difference between their Sum and Difference? *Anſw*. 96.

67. There are two Numbers, the one 63, the other half as much; I demand the Product of their Squares, and the Difference of their Product and Sum?

Anſw. } *Product of the Squares*. 3938240.25
} *Difference* 1890.

68. There are two Numbers, the one 25, the other the Square of 25; I demand the Square-Root of the Sum of their Squares? *Anſw*. 625.4998+

69. There are two Numbers whoſe Product is 1058, and Multiplicand 46; I demand the multiplier, the Sum of the Factors, and the Difference between the Sum of the Cubes of the Factors, and the Square of the Product;

Anſw. *Multiplier* —— 23.
Sum of the Factors 69.
Difference——1009861.

70. There are two Numbers whoſe Dividend is 1216, and the Quotient 76. I demand the Diviſor, the Difference between the Cube of the Quotient, and the Sum of the Squares of the Diviſor and Dividend, and the Cube-Root of the Sum of the Cubes of the Diviſor, Dividend and Quotient.

Anſw. *Diviſor* —— 16.
Difference 1039936.
Cube-Root — 1216.

71. Two men ſet out at the ſame Time from the ſame Place, but go contrary Ways, and they travel each of them 34 miles a Day; I demand the Time in which they will have travelled 2000 miles? *Anſw.* 29 *days.* 9 *hrs.* 52 *min.* $\frac{64}{68}$.

72. Six Rogues, *viz.* *A*, *B*, *C*, *D*, *E* and *F*, having entered into a Confederacy, do agree to divide whatever ſums of money they ſhall at any Time take upon the Highways, according to their Valour, that is, in proportion to the Number of ſcars they ſhould then have on their Faces: Now the firſt two, *viz.* *A* and *B*, being very bold and daring Fellows, had received *A* 20, and *B* 19 ſcars: The next two; *viz.* *C* and *D* having a leſs ſhare of Courage, and not caring to ſtand all Brunts, had each of them but 9 ſcars; but the other two, *viz.* *E* and *F*, being mere Cowards; always turned their Backs at the leaſt Oppoſition, and ſo by chance they had one a piece; and they having, at ſeveral times, ſtolen the ſum of 700*l.* 13*s.* do deſire to know how they muſt divide it?

		l.	*s.*	*d.*	*qrs.*
Anſw.	A *muſt have*	237	10	2	$0\frac{8}{59}$
	B - - - - - -	225	12	7	$3\frac{43}{59}$
	C - - - - - -	106	17	6	$3\frac{39}{59}$
	D - - - - - -	106	17	6	$3\frac{39}{59}$
	E - - - - - -	11	17	6	$0\frac{24}{59}$
	F - - - - - -	11	17	6	$0\frac{24}{59}$
	£.	700	13	0	

73. There are three Numbers, 17. 19 and 48; I demand the Difference between the ſum of the ſquares of the firſt and laſt and the Cube of the middlemoſt? *Anſw.* 4266.

74. In 7 Cheeſes, each weighing 1*C.* 2*qrs.* 5℔ how many Allowances for ſeamen may be cut, each weighing 5*oz.* 7*dr.*? *Anſw.* 3563 $\frac{35}{87}$ *allowances.*

75. In 81034 Rundlets of Brandy, each 18 Gallons, how many Groſs of Bottles, each $\frac{8}{9}$ of a Quart? *Anſw.* 45581 *groſs,* 7*doz.* 6 *bottles.*

76. In 531 *doz.* Bottles of Wine, each 1$\frac{5}{9}$ Pint, how many Hhds? *Anſw.* 29*hhds.* 52 *gal.* 5 *pints* $\frac{5}{9}$.

77. Sold 8 *C.* ½ of ſteel at 12*d.* *per* ℔ how much *Flemiſh* Money at 33*s.* 8*d. per* Pound ſterling, am I to receive for ſame? *Anſw.* 80*l.* 2*s.* 6*d.* $\frac{96}{240}$ *Flemiſh.*

78. If 48 taken from 120 leave 72, and 72 taken from 91 leave 19, and 7 taken from thence leave 12; what Number is that out of which when you have taken 48, 72, 19 and 7, leaves 12? *Anſw.* 158.

79. *A* hath $\frac{1}{2}$ of a Ship, *B* $\frac{1}{4}$, *C* $\frac{1}{16}$, *D* $\frac{3}{16}$, the maſter clears 120*l.* how much muſt each Owner have?

		l.	*s.*	*d.*
Anſw.	A *muſt have*	60	0	0
	B - - - - - - -	30	0	0
	C - - - - - - -	7	10	0
	D - - - - - - -	22	10	0
		120	0	0

80. A Gentleman having 50*s.* to pay among his Labourers for a Day's Work, would give to every Boy 6*d.* to every Woman 8*d.* and to every Man 16*d.* the Number of Boys, Women and Men was the ſame; I demand the Number of each? *Anſw.* 20 *of each ſort.*

81. A Gentleman had 7*l.* 17*s.* 6*d.* to pay among his Labourers, to every Boy he gave 6*d.* to every Woman 8*d.* and to every Man 16*d.* and there were for every Boy three Women and for every Woman two Men; I demand the Number of each? 15 *Boys,* 45 *Women and* 90 *Men.*

82. Admit a Tax of 39*l.* is laid on a Town for the building of a Bridge, and the Value of the Town Rent is 900*l.* *per ann.* what ſhall a Man pay towards it, whoſe Income is worth 100*l.* *per ann*? *Anſw.* 4*l.* 6*s.* 8*d.*

83. Suppoſe *A* hath an Eſtate of 53*l.* *per ann.* and pays 5*s.* 10*d.* to a ſubſidy; what ſhall *B* pay, whoſe Eſtate is worth 100*l.* *per ann*? *Anſw.* 11*s.* 0*d.* $\frac{4}{53}$.

84. If 136*l.* are to be divided between two Men, ſo as the leſſer Share may have ſuch Proportion to the greater as 2 to 5; what muſt each Man have?

		l.	*s.*	*d.*	*qrs.*
Anſw.	*One muſt have*	38	17	1	$2\frac{6}{7}$
	The other - - -	97	2	10	$1\frac{1}{7}$
		136	0	0	

85. There are 1000*l.* to be divided among 3 Men, in ſuch manner, that if *A* have 3*l.* *B* ſhall have 5*l.* and *C* 8*l.* how much muſt each Man have?

		l.	*s.*
Anſw.	A *muſt have*	187	10
	B - - - - - -	312	10
	C - - - - - -	500	0
		1000	0

86. Shipt for *Jamaica* 550 Pair of Stockings, at 11*s.* 6*d.* *per* Pair, and 460 Yards of Stuff, at 14*d.* *per* Yard: in Return for which I had 46*C.* 3*qrs.* of Sugar, at 26*s.* 6*d.* *per C.* and 1570℔ of Indigo, at 2*s.* 4*d.* *per* ℔; what remains due to me of my Adventure? *Anſw.* 102*l.* 12*s.* 11*d.* 2*qrs.*

87. If one Pound ten, and forty Groats
Will buy a Load of Hay;
How many Pounds with nineteen Crowns
For twenty Loads will pay?
Anſw. 38*l.* 11*s.* 8*d.* *Iriſh* 38*l.* 3*s.* 9*d.*

88. A Man driving his Geeſe to the Market, was met by another, who ſaid, Good morrow Maſter with your Hundred Geeſe. Says he, I have not an Hundred; but if I had half as many as I now have, and the Square of two more, beſide the Number I have already, I ſhould have an Hundred; how many had he? *Anſw.* 64.

89. If a Tower be 384 Feet high from the Foundation, and a ſixth Part be under the Earth, and an eight Part under the Water; how much is in Height viſible? *Anſw.* 272 *Feet.*

90. A Merchant would lay out in Spices 560*l.* at the following Prices, *viz.* Cloves at 4*s.* *per* ℔, Mace at 7*s.* Cinnamon at 3*s.* Nutmegs at 12*s.* and Pepper at 2*d.* *per* ℔, and he would have an equal Quantity of each ſort; I demand that Quantity? *Anſw.* 400℔ *of each ſort.*

91. The computed Diſtance between *London* and *York* is 150 miles; now if a Man ſet out from *London*, and walk every Day towards *York* 20 miles, and back again toward *London* 15 miles how long will it be before he gets to his Journey's End? *Anſw.* 30 *Days.*

92. Bought 127 Pieces of Cloth, for which I deliver'd 13589 Yards of Holland at 7*s.* 11*d per* Ell *Engliſh*; what coſt a Piece of that Cloth? *Anſw.* 33*l.* 17*s* 2*d.* 2*qrs.* $\frac{58}{127}$.

93. The Account of a certain School is as followeth, *viz.* $\frac{1}{16}$ of the Boys learn Geometry, $\frac{3}{8}$ learn Grammar, $\frac{3}{10}$ learn Arithmetic, $\frac{3}{20}$ learn to write, and 9 learn to read; I demamand the Number of each?

Anſw. { 5 *Geometers.*
30 *Grammarians.*
24 *Arithmeticians.*
12 *Writers,*
9 *Readers.*

94. I have laid out for a Merchant 638*l.* 17*s.* 3*d.* he allows me 2¾ *per cent.* before that, I owed him 184*l.* 17*s.* 9*d.* how much is he indebted to me? *Anſw.* 471*l.* 10*s.* 10*d* 1*qr.*

95. Bought a Tun of Wine for 78*l.* 17*s.* at what Price muſt I ſell it *per* Quart to gain 5*l.* 10*s.* by the Whole, when there were 22 Gallons leaked out? *Anſw.* 22*d* +

96. If out of 10*s. per* Week I lay up 4*d.* 2*qrs. per* Day *Sundays* excepted, and have ſaved 9*l.* 2*s.* 3*d.* how long was I in laying it up, and how much have I ſpent in that Time?

Anſw. { 567 *Days in laying up.*
31*l.* 7*s.* 9*d.* *ſpent.*

97. If I buy 1000 Ells *Flemiſh* of Linen for 90*l.* what may I ſell it *per* Ell in *London* to gain 10*l.* by the Whole? *Anſw.* 3*s.* 4*d. per Ell.*

98. Bought threeſcore Pieces of Holland for three times as many Pounds, and ſold them again for four times as much; but if they had coſt me as much as I ſold them for, what ſhould I have ſold them for to gain after the ſame Rate? *Anſw.* 320*l.*

99. There are three Quantities of Silver, each of the ſame Weight but different in Value, the Weight of each Quantity is 10 *oz.* the Value of the firſt Sort is 4*s. per oz* of the ſecond 4*s.* 6*d. per oz.* and of the third 5*s. per oz.* I demand the Worth of an *oz.* when they are all melted down together? *Anſw.* 4*s.* 6*d. per oz.*

100. I have received Advice from my Factor, that he has diſburſed upon my Account the Sum of 4000 Guilders, 15 Stivers; I demand what Sum I muſt anſwer for that in *Engliſh* Money, Exchange at Par, and alſo what his Commiſſion comes to at 2 *per cent?*

Anſw. 400*l.* 1*s.* 6*d.* *Sterling,*
8*l.* 0*s.* 0*d.* 1*qr.* *Commiſſion.*

101. A Merchant bought a Parcel of Jewels for 220*l.* and ſold them again for 440*l.* payable at the End of 6 Months; I demand what the Gain was worth in Ready Money, Rebate being made at 6 *per cent?* *Anſw.* 213*l.* 11*s.* 10*d.*+

102. A Factor bought 4 Cheſts of Sugar, the Mark and Weight as follows,

	C.	*qrs.*	℔
A - - -	10	3	14
B - - -	12	1	17
C - - -	13	1	19
D - - -	11	2	10

Now ſuppoſing the Tare or Weight of every Cheſt, when it is empty to be 38℔; I demand the Neat Weight of the ſaid Sugar, alſo I demand the prime Coſt of the ſame, ſuppoſing it came to 18*s.* *per C.* including the Charges of Porterage, Warehouſe room, Cuſtom *&c.* alſo I demand the whole Gain, and the Gain *per cent.* ſuppoſing the Cheſts *A* and *B* were ſold afterwards at 28*s.* *per C.* and the other two Cheſts, *viz.* *C* and *D* at 4*d.* *per* ℔?

		l.	*s.*	*d.*
Anſw.	*Prime Coſt* - - - - -	42	4	8½
	Whole Gain - - - - -	34	16	4½
	Gain per cent. - - -	82	8	3¼

103. A poor Woman carrying ſome Eggs to Market met with a rude Fellow who broke them all, but preſently after, conſidering what he had done, went back and told the Woman he was willing to make Satisfaction, provided ſhe could tell how many there were; ſhe anſwered ſhe could not tell, but the beſt Account that ſhe could give, was, that when ſhe told them in by two at a time there was one left, when by three, there was one left, and when by four there was one left, but when ſhe told them in by five, there was none left; I demand how many Eggs the Woman had? *Anſw.* 25.

Operation 2×3×4×1=25.

104. A Gentleman a Chaiſe did buy,
An Horſe and Harneſs too,
They coſt the Sum of threeſcore Pounds,
Upon my Word 'tis true:
The Harneſs came to half of th' Horſe,
The Horſe twice of the Chaiſe;
And if you find the Price of them,
Take them and go your ways.

Anſw.		*l.*
	Chaiſe - - - - - -	15
	Horſe - - - - - -	30
	Harneſs - - - - -	15
		60

A ſhort Collection of pleaſant and diverting QUESTIONS.

- A General having a Caſtle ſituate on a Square, and garriſon'd by 48 Soldiers, ſo order'd them as that any wo Corners and the Side between them ſhould conſiſt of 18 Ien; but he thinking there were not Men enow, hired 8 nore, but ſtill kept the ſame Number of 18 Men as before: fterwards 16 Men were paid off, he not having Occaſion or them; but yet he kept up his Number of 18 Men. I denand how he muſt place the ſaid Men to make 18 every Vay, when he had 48, 56 and 40 Soldiers?

2. Suppoſe the nine Digits to be placed in a quadrangular orm: I demand in what Order they muſt ſtand, that any hree Figures in a right Line may make juſt 15?

3. Let 12 be ſet down in four Figures, and let each Fiure be the ſame.

4. A Countryman having a Fox, a Gooſe, and a Peck of orn, in his Journey came to a River, where it ſo happened at he could carry but one over at a Time: Now, as no two ere to be left together that might deſtroy each other, ſo he as at his Wit's End how to diſpoſe of them; for, ſays he, ho' the Corn can't eat the Gooſe, nor the Gooſe eat the Fox, t the Fox can eat the Gooſe, and the Gooſe eat the Corn. he Queſtion is how he muſt carry them over?

5. Three jealous Huſbands with their Wives, being ready to paſs by Night over a River, do find at the River ſide a Boat which can carry but two Perſons at once, and for want of Waterman, they are neceſſiated to row themſelves over the River at ſeveral times. The Queſtion is, how theſe 6 Perſons ſhall paſs by 2 and 2, ſo that none of the three Wives may be found in the Company of 1 or 2 Men unleſs her Huſband be preſent? *Wingate.*

6. Two merry Companions are to have equal Shares of 8 Gallons of Wine, which are in a Veſſel containing exactly 8 Gallons: Now to divide it equally between them, they have only two other empty Veſſels, of which 1 contains 5 Gallons, and the other 3; the Queſtion is, how they ſhall divide the ſaid Wine between them, by the Help of theſe 3 Veſſels, ſo that they may have 4 Gallons a-piece? *Wingate.*

7. Let it be required to find five Weights which may be ſufficient at a ſingle Draught. (without any others) to weigh any Number of Pounds under 122 Pounds? *Here they may occaſionally be uſed as Back-weights.* *Poor Robin.*

8. Let it be required (without uſing any of them as Back-weights) to find 7 different Weights ſufficient to weigh any Number of Pounds not exceeding 128, at a ſingle Draught? *Poor Robin.*

9. A Man went to Market and bought a hundred of Eggs (*viz.* 120) at 3 a Penny,—The next Market day he bought another hundred (*viz.* 120) at 2 a Penny, both which he mingled together, and ſold at 5 for 2 pence. Now upon the whole I demand his Gain or Loſs?

10. A Man laid out 5 Shillings in Eggs at the rate of 3 a Penny: And again 5 Shillings more at 2 a Penny, when he had done he mingled the two parcels together and ſold them at 8 for Two-pence: The Gain or Loſs is demanded?

11. Another Man laid out 10 Shillllings in Eggs at 3 a Penny, and ſold them again at 2 a Penny, and the following Market day he bought 10 Shillings worth of Eggs at 2 a penny, and ſold 'em at 3 a Penny, his Gain or Loſs upon the whole is demanded?

AN
APPENDIX

By T. M.

Short Ways of caſting up the Price of Goods by Multiplication.

AS the Excellency and Expeditiouſneſs of this Method is ſo univerſally known and acknowledged, it ſeems unneceſſary to add any thing to recommend it: I ſhall therefore proceed to explain it in the four following *Caſes*, after having preſented the Learner with the following,

GENERAL RULE.

Multiply the Price by the Number or Quantity of Yards, Pounds, &c. in this manner: Begin with multiplying the Farthings by the Quantity, for every 4 in the Product carry 1 Penny, and ſet down the Remainder if any; then multiply the Pence by the Quantity, and to the Product add the Pence you found in the Farthings, for every 12 in this Sum carry 1 Shilling, and ſet down the Remainder, if any; next multiply the Units Place of the Shillings by the Quantity, to the Product add the Shillings you found in the Pence, for every 10 therein carry 1, and ſet down the Remainder, if any; then multiply the Tens Place in the Shillings by the Quantity, and to the Product add the Tens you found in the Units Place of the Shillings, half of which Sum (each of them being 10 Shillings) will be Pounds *Sterling*, and ſet down the Remainder, if any; *laſtly*, multiply the Pounds (if there be any in the Price) by the Quantity, to which add the Pounds found in the Shillings, for every 10 in the Sum carry 1, and ſet down the Remainder, if any; and ſo proceed till you have multiplied all the Pounds in the *Multiplicand*.

CASE 1.

When the Number or Quantity, whoſe Price is required, does not exceed 12, multiply the Price of one by the whole Quantity, obſerving the *General Rule*, and the Product will be the Anſwer.

EXAMPLES.

3 *Yards of Linen, at* 3*s.* 10*d. per Yard?*

3 10
3
———
11 6
———

4 *Pounds of Tea, at* 7*s.* 5*d.* ¾ *per* ℔?

7 5¾
4
———

5 *Ells of Cambrick, at* 13*s.* 10*d*¼ *per Ell?*

13 10¼
5
———

6 *C. of Butter, at* 19*s.* 7*d.*½ *per C. wt.*

19 7½
6
———

7 *Yards of Silk, at* 1*l.* 13*s.* 5*d*¾ *per Yard?*

1 13 5¾
7
———

8 *Yards of Brocade, at* 2*l.* 11*s.* 11*d.* ¼ *per Yard?*

2 11 11¼
8
———

———

9 *C. of Hops at* 3*l.* 19*s.* 7*d.*¾ *per C.*

3 19 7¼
9
———

10 *Hhds of Tobacco, at* 7*l.* 17*s.* 8*d.* ½ *per Hhd.*

7 17 8½
10
———

11 *Hhds. of Claret, at* 17*l.* 15*s.* 10¼ *per Hhd.*

17 15 10¼
11
———

12 *Tuns of Burgundy, at* 37*l.* 17*s.* 9*d.* ¾

37 17 9¼
12
———

CASE 2.

When the Quantity exceeds 12, and is ſuch a Number that if it be divided by any Number not exceeding 12, ſhall give for a Quotient another Number without a Remainder not exceeding 12; or if it is ſuch a Number that any two Numbers, each of which muſt not exceed 12, being multiplied together will produce the Quantity given; then having found ſuch two Numbers, multiply the Price by one of them (it matters not which you multiply by firſt) and the Product by the other, ſtill obſerving the *General Rule,* and the laſt Product will be the Anſwer.

Examples.

EXAMPLES.

15 *Yards of Linen, at* 4*s.* 7*d.*¼ *per Yard?*

```
            4   7¼
                5
         ─────────
       1   3   0¼
               3
         ─────────
Anſwer 3   9   0¾
         ─────────
```

33 ℔ *of Tea,* at 8*s.* 10*d.* ¾ *per* ℔?

49 *C. of Raiſions at* 15*s.* 11*d.*¾ *per C.*

63 *C. of Currants at* 1*l.* 11*s.* 10*d.* ½ *per C.*

77 *C. of Tobacco at* 2*l.* 0*s.* 7*d.*¼ *per C.*

81 *C of Pepper, at* 7*l.* 18*s.* 7*d.* ½ *per C.*

```
7  18  7½
        9
─────────
```

99 *Hhds. of Claret at* 13*l.* 11*s.* 0*d.* ¼ *per Hhd.*

108 *Puncheons of Brandy, at* 28*l.* 13*s.* 1*d.*½ *per Puncheon?*

121 *Cheſts of Tea, at* 118*l.* 17*s.* 11*d.* ½ *per Cheſt?*

144 *Tuns of Wine,* at 78*l.* 17*s.* 3*d.* ¾ *per Tun?*

CASE 3.

When the Quantity is ſuch a Number that no two Numbers in the *Multiplication Table* can be found to anſwer it, then multiply by two ſuch Numbers as come neareſt to it, as in the laſt *Caſe*; then if the Product of the two Numbers you multiplied by is leſs than the given Quantity, multiply the Price by the Number that is wanting, which add to the other Product, and the Total will be the Anſwer: But if the Product of the two Numbers you multiplied by exceeds the given Quantity, multiply the Price by the Number exceeding the given Quantity, which ſubtract from the other Product, and the Remainder will be the Anſwer.

EXAMPLES.

17 *C. of Tallow, at* 1*l.* 13*s.* 8*d.*¼ *per C.*

l.	s.	d.
1	13	8¼
		4
6	14	9
		4
26	19	0

1ſt+3d. *Facit* 28 12 8¼

37 *Yards of Velvet, at* 17*s.* 10*d.* ½ *per Yard?*
6×6+1ſt.

74 *Yards of Cambrick, at* 8*s.* 5*d.* ½ *per Yard?*

86 *Bullocks, at* 2*l.* 1*s.* 0*d.*¾ *per Head?*

94 *Sheep at* 13*s.* 1*d.*¾ *each?*

53 ℔ *of Tea, at* 11*s.* 3*d.* ¾ *per* ℔?

l.	s.	d.
	11	3¾
		9
5	1	9¾
		6
30	10	10½

3d.—1ſt. *Facit* 29 19 6¾

69 *Tubs of Butter, at* 1*l.* 3*s.* 11*d* ½ *per Tub?*
10×7—1ſt.

105 *Gallons of Whiſkey, at* 5*s.* 8*d.* ½ *per Gal.*

113 *C. of Tobacco, at* 2*l.* 17*s.* 3*d.* ½ *per C.*

139 *Ells of Holland, at* 9*s.* 10*d.* ¾ *per Ell?*

CASE 4.

When the Quantity is 1, 2, 3, 4, or more Hundreds, always multiply the Price by 10, and then that Product by 10 alſo, which produces the Value of one Hundred; then multiply that Product by the Number of Hundreds, whether 2, 3, 4, or 5, *&c.* and the laſt Product is the Value of ſo many Hundreds as there are in the Quantity; then for the Tens, (if any) whether 20, 30, 40, 50, *&c.* multiply that Product which gives the Price of 10, either by 2, 3, 4, or 5, as the Tens ſhall happen, which place under the Value of the Hundreds, without drawing a Line; and for the Units (if any) always multiply the Price by them, whether 2, 3, 4, *&c.* and ſet that alſo under the former Products, and the Total of them will be the Anſwer: But if the Quantity be 1, 2, 3, 4, or more Thouſands, multiply the Price continually by three Tens, and the Product will be the Value of one Thouſand, which multiply alſo by the Number of Thouſands; then multiply the Value of one Hundred by the Number of Hundreds (if any) which ſet under the Value of the Thouſands; next find the Value of the Tens and Units (if any) as directed above, which ſet under the former Products, and the Sum of all will be the Value of the whole Quantity.

EXAMPLES.

437 *Yards of Linen, at* 3*s.* 8*d*¼ *per Yard?*

		3	8¼
			10
	1	16	10½
			10
	18	8	9
			4
	57	15	0
	5	10	7½
	1	5	9¾
Anſwer	64	11	5¼

705 ℔ *of Tea, at* 6*s.* 3*d.*¼ *per* ℔?

970 *Gallons of Hock, at* 5*s.* 11*d.* ½ *per Gallon?*

4879 *Yards of Linen, at* 1*s.* 7*d.* ½ *per Yard?*

7057 ℔ *of Sugar, at* 2*s.* 3*d.*¾ *per* ℔?

5309 *Skins, at* 3*s.* 10*d.*¾ *per Skin?*

DIVISION of MONEY.

THERE being ſome Parts of this *Diviſion* not clearly ſet forth by the Authors who have wrote concerning it, I ſhall endeavour to make it plain in the three following *Caſes*; but firſt ſet down the following.

GENERAL RULE.

Divide the Sum of Money, without reducing it, (which is the Dividend) by the Number of Perſons it is to be divided equally among (which is the Diviſor) thus; Begin with dividing the Pounds in the Dividend, if any, as Whole Numbers, and the Quotient (which in the Two firſt *Caſes* is ſet under the Dividend) will be the Pounds in the Anſwer; the remaining Pounds, if any, bring (mentally) into Shillings, which is done by multiplying them by 20, to which add the Shillings in the Dividend, if any, and divide the Sum by the Diviſor, and the Quotient will be the Shillings in the Anſwer; the remaining Shillings, if any, bring into Pence which is done by multiplying them by 12, to which add the Pence in the Dividend, if any, and divide the Sum by the Diviſor, and the Quotient will be the Pence in the Anſwer; the remaining Pence, if any, bring into Farthings, which is done by multiplying them by 4, to which add the Farthings in the Dividend, if any, and divide the Sum by the Diviſor, and the Quotient will be the Farthings in the Anſwer: Note down the Remainder, if any, and repeat this Work as often as is neceſſary.

CASE 1.

When the Number of Perſons amongſt whom a Sum of Money is given to be equally divided, does not exceed 12.

RULE

Divide the Sum of Money, without reducing it, by the whole Number of Perſons (obſerving the *General Rule*) and the Quotient will be each Man's Share.

EXAMPLES.

Divide 11*l.* 18*s.* 10*d.* ½ *between* 3 *Men equally?*

3)11 18 10½(

3 19 7½

Divide 7*s.* 3*d.* ¾ *between* 8 *Men equally?*

Theſe Queſtions are proved by multiplying the Quotient, of each Perſon's Share, by the Diviſor, or Number of Perſons, which produces the Dividend, or Sum of Money given to be divided.

Examples.

EXAMPLE.

3 19 7½ *each perſon's Share.*
3 *Number of perſons.*

11 18 10½ *Sum given to be divided.*

Divide 3*l.* 13*s.* 8*d.* ½ *between* 5 *Men equally?*

5)3 13 8½(

Divide 18*s.* 7*d.* ¾ *between* 7 *Men equally?*

Divide 6*l.* 11*s.* 10*d.* ¼ *between* 9 *Men equally?*

Divide 9*l.* 1*s.* 0*d.* ¾ *between* 10 *Men equally?*

10)9 1 0¾

Divide 101*l.* 13*s.* 1*d.* ¾ *between* 11 *Men equally?*

Divide 710*l.* 17*s.* 11*d* ⅓ *between* 12 *Men equally?*

CASE 2.

When the Number of Perſons amongſt whom a Sum of Money is given to be equally divided exceeds 12, yet ſo as that it can be divided into two or more Meaſures of the Number given (none exceeding 12) in ſuch Manner, that if all the Meaſures ſo found be multiplied continually together, they ſhall produce the Number given.

RULE.

Divide the Sum of Money, without reducing it, by one of the Meaſures (it matters not which you divide by firſt) and the Quotient by another, and ſo proceed, dividing the laſt Quotient by the remaining Meaſures, till you have divided by them all, (ſtill obſerving the *General Rule*) and the laſt Quotient will be each Perſon's Share.

EXAMPLES.

Divide 15*l.* 13*s.* 3*d.* ¾ *between* 27 *Men equally?*

9) 15 13 3¾(

3) 1 14 9¾(

Anſwer 0 11 7¼

Divide 27*l.* 15*s.* 11*d.* ½ *between* 55 *Men equally?*

11) 27 15 11½(

5) 2 10 6½(

Anſwer 0 10 1¼⅕

Queſtions in this *Caſe* are proved by multiplying the laſt Quotient, or each Perſon's Share, by one of the Meaſures, and the Product by another, ſtill repeating the Multiplication of the laſt Product by the remaining Meaſures, and the laſt Product will be the Dividend, or Sum of Money given to be divided

EXAMPLES.

11 7¼ *each Perſon's Share.*
3
1 14 9¾
9
15 13 3¾ *Money to be divided.*

Divide 37*l.* 11*s.* 1*d.*¼ *between* 63 *Men equally?*
9)37 11 1¼(
7) 4 3 5¼$\frac{8}{9}$(
Anſwer 0 11 11$\frac{17}{63}$.

Divide 91*l.* 16*s.* 2*d.*½ *between* 99 *Men equally?*
Meaſures are 11 *and* 9.

If 1 *C.wt. of Butter coſt* 1*l.* 10*s* 4*d. what coſt* 1 ℔?
2)1 10 4(
7)
8)

Divide 761*l.* 13*s.* 8*d.*½ *between* 132 *Men equally?*
Meaſures 12 *and* 11.

Divide 107*l.* 12*s.* 3*d.*¼ *between* 315 *Men equally?*
9)107 12 3¼(
7)
5)

Divide 2718*l.* 17*s.* 11*d. between* 924 *Men equally?*
Meaſures 12, 11 *and* 7.

Note, *In Queſtions where the Number of Meaſures exceed two, as in the two laſt* Examples, *I would adviſe the Learner to to-work them by the following* Caſe, *as the Meaſures are not readily found.*

CASE 3.

When the Number of Perſons amongſt whom a Sum of Money is given to be equally divided exceeds 12, yet ſo as that it cannot be divided into two or more Meaſures in whole Numbers without a Remainder:

RULE.

Divide the Sum of Money, without reducing it by the whole Number of Perſons it is to be divided among, according to the Method of *Long Diviſion*; that is, by ſetting down the Operation at large, ſtill obſerving the *General Rule*, and the Quotient will be each Perſon's Share. *See the following* Examples.

APPENDIX.

EXAMPLES.

Divide 77*l.* 14*s.* 10*d.*$\frac{3}{4}$ *between* 34 *Men equally?*

l. s. d.
34)77 14 10$\frac{3}{4}$(2 5 8$\frac{3}{4}$ $\frac{5}{34}$
68
9
20
)194(
170
24
12
)298(
272
26
4
)107(
102
$\frac{5}{34}$ *Remainder*

Divide 1171*l.* 14*s.* 9*d.*$\frac{3}{4}$ *between* 383 *Men equally?*

l. s. d.
383) 1711 14 9$\frac{3}{4}$(3 2 2$\frac{1}{4}$
1149
22
20
)454(
383
71
12
)861(
766
95
4
)383(
383
. ...

Divide 42*l.* 18*s.* 10*d.*$\frac{1}{4}$ *between* 79 *Men equally?*
Anſ. 10*s.* 10*d* $\frac{1}{4}\frac{66}{79}$.

Divide 7010*l.* 11*s.* 2*d*$\frac{1}{2}$ *between* 2171 *Men equally?*
Anſ. 3*l.* 4*s.* 7*d.*$\frac{18}{2171}$.

Divide 148*l.* 4*s.* 8*d. among* 19 *Men and* 1 *Boy, ſo that the Boy may have half an equal Share with the Men?*

Note, *The foregoing Queſtions and all others that come under this* Caſe, *are more expeditiouſly performed by Decimals, thus*

Queſtion 1.
77 14 10$\frac{3}{4}$
34)77.743(2.286
2 5 8$\frac{3}{4}$

Queſtion 2.
42 18 10$\frac{1}{4}$
79)42.943(.543
0 10 10

Queſtion 3.
2171 14 9$\frac{3}{4}$
383)1171.74(3.050
3 1 2$\frac{1}{4}$

Queſtion 4.
7010 11 2$\frac{1}{2}$
2171)7010.56(3.229
3 47

APPENDIX.

INTEREST in EPITOME.

A TABLE at 6 per Cent. for 1 Day.

Principal	Intereſt				Prin.	Intereſt			
Pounds.	l.	s.	d.	1000 Parts	Pou.	l.	s.	d.	1000 Parts
9000000	1479	9	—	493	4000		13	1	808
8000000	1315	1	4	438	3000		9	10	356
7000000	1150	13	8	383	2000		6	6	904
6000000	986	6	—	328	1000		3	3	452
5000000	821	18	4	274	900		2	11	506
4000000	657	10	8	219	800		2	7	561
3000000	493	3	—	164	700		2	3	616
2000000	328	15	4	109	600		1	11	671
1000000	164	7	9	54	500		1	7	726
900000	147	18	10	849	400		1	3	780
800000	131	10	1	643	300			11	835
700000	115	1	4	438	200			7	890
600000	98	12	7	232	100			3	945
500000	82	3	10	27	90			2	550
400000	65	15	—	821	80			2	156
300000	49	6	3	616	70			1	761
200000	32	17	6	410	60			1	367
100000	16	18	9	205	50			1	972
90000	14	15	10	684	40				578
80000	13	3	—	164	30				183
70000	11	10	1	643	20				789
60000	9	17	3	123	10				394
50000	8	4	4	602	9				355
40000	6	11	6	82	8				315
30000	4	18	7	561	7				276
20000	3	5	9	41	6				236
10000	1	12	10	520	5				197
9000	1	9	7	68	4				157
8000	1	6	3	616	3				118
7000	1	3	—	164	2				78
6000		19	8	712	1				39
5000		16	5	260					

APPENDIX.

A TABLE at 5 per Cent for 1 Day.

Principal	Intereſt				Prin.	Intereſt			
Pounds.	*l.*	*s.*	*d.*	1000 *Parts*	*Pou*	*l.*	*s.*	*d.*	1000 *Parts*
10000000	1369	17	3	123	5000		13	8	383
9000000	1232	17	6	410	4000		10	11	506
8000000	1095	17	9	698	3000		8	2	630
7000000	958	18	—	986	2000		5	5	753
6000000	821	18	4	274	1000		2	8	876
5000000	684	18	7	561	900		2	5	589
4000000	547	18	10	849	800		2	2	301
3000000	410	19	2	137	700		1	11	13
2000000	273	19	5	424	600		1	7	726
1000000	136	19	8	712	500		1	4	438
900000	123	5	9	41	400		1	1	150
800000	109	11	9	369	300			9	863
700000	95	17	9	698	200			6	575
600000	82	3	10	27	100			3	287
500000	68	9	10	356	90			2	958
400000	54	15	10	684	80			2	630
300000	41	1	11	13	70			2	301
200000	27	7	11	342	60			1	972
100000	13	13	11	671	50			1	643
90000	12	6	6	904	40			1	315
80000	10	19	2	137	30				986
70000	9	11	9	369	20				657
60000	8	4	4	602	10				328
50000	6	16	11	835	9				295
40000	5	9	7	68	8				263
30000	4	2	2	301	7				230
20000	2	14	9	534	6				197
10000	1	7	4	767	5				164
9000	1	4	7	890	4				131
8000	1	1	11	13	3				98
7000		19	2	137	2				65
6000		16	5	260	1				32

A P P E N D I X.

Uſe of the foregoing TABLE.

ALWAYS multiply the Sum by the Number of Days, or the Number of Days by the Sum, and the Intereſt of the Product may be found in this Table, as is apparent by an Example.

To find the Intereſt of 5654*l.* for 154 Days. The Sum being multiplied as directed, its Product is 870716 for one Day; and the Sum found in the Table againſt the Principal ſeparated into Parts, (as in the Example) being collected into one will be 143*l.* 2*s.* 7*d.* $\frac{532}{1000}$=the Intereſt required.

E X A M P L E.

Principal propoſed 5654
Multiplied by 154 *The Number of Days.*
22616
28270
5654
Product 870716

		£.	s.	d.
800000	is	131	10	1.643
70000		11	10	1.643
700		0	2	3.616
10		0	0	0.394
6		0	0	0.236
Principal 870716	*Int.*	143	2	$7\frac{532}{1000}$.

E X A M P L E 2.

To find the Intereſt *of* £.364 17*s.* 6*d.* *for* 395 *Days.*
The Decimal of 17*s* 6*d.* is .875
which added to 364. is = 364.875
Multiply by 395 N° of Days.
1824375
3283875
1094625
Product 144125.625

		£.	s.	d.
100000	is	16	8	9.205
40000		6	11	6.082
4000		0	13	1.808
100		0	0	3.945
20		0	0	0.789
5		0	0	0.197
.6		0	0	0.023
The Intereſt		£ 23	13	10.49

Or by taking Parts of the Number of Days for 17s. 6d. and adding to the Product.
395
364
1580
2370
1185
143780
197.05 ½ of 395
98.75 ¼ of 395 } for 17s 6d
49.37 ⅛ of 395
144125.62 The ſame as before.

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EXAMPLE 1.

4050 Skains at 1l. 3s. 6d. per Hundred.
Multiply by 23 the Shillings for 100 Skains.
12150
8100
½ 2025 for 6d.
951|75 cut off 2 Figures on the Right; reſt are ſhils
12 multip. by 12, cut off 2 Figures 9d. remains
Anſw. 47l. 11s. 9|00d.

EXAMPLE 2.

2945 Skains at 17s. 4d. per Hundred.
17 Multiply by the Shills. take parts for Pence
20615
2945
⅓ 981 : 2 for the 4 Pence
520|46 cut off 2 figures on the Right, reſt are ſhills.
12 multiply the Figures cut off, by 12.
5|52 cut off 2 figures and we have 5 Pence.
4 multiply by 4.
25 10 5 2|08 cut off 2 Figures and we have 2 farth.
Anſw. 25l. 10s. 5½d.

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